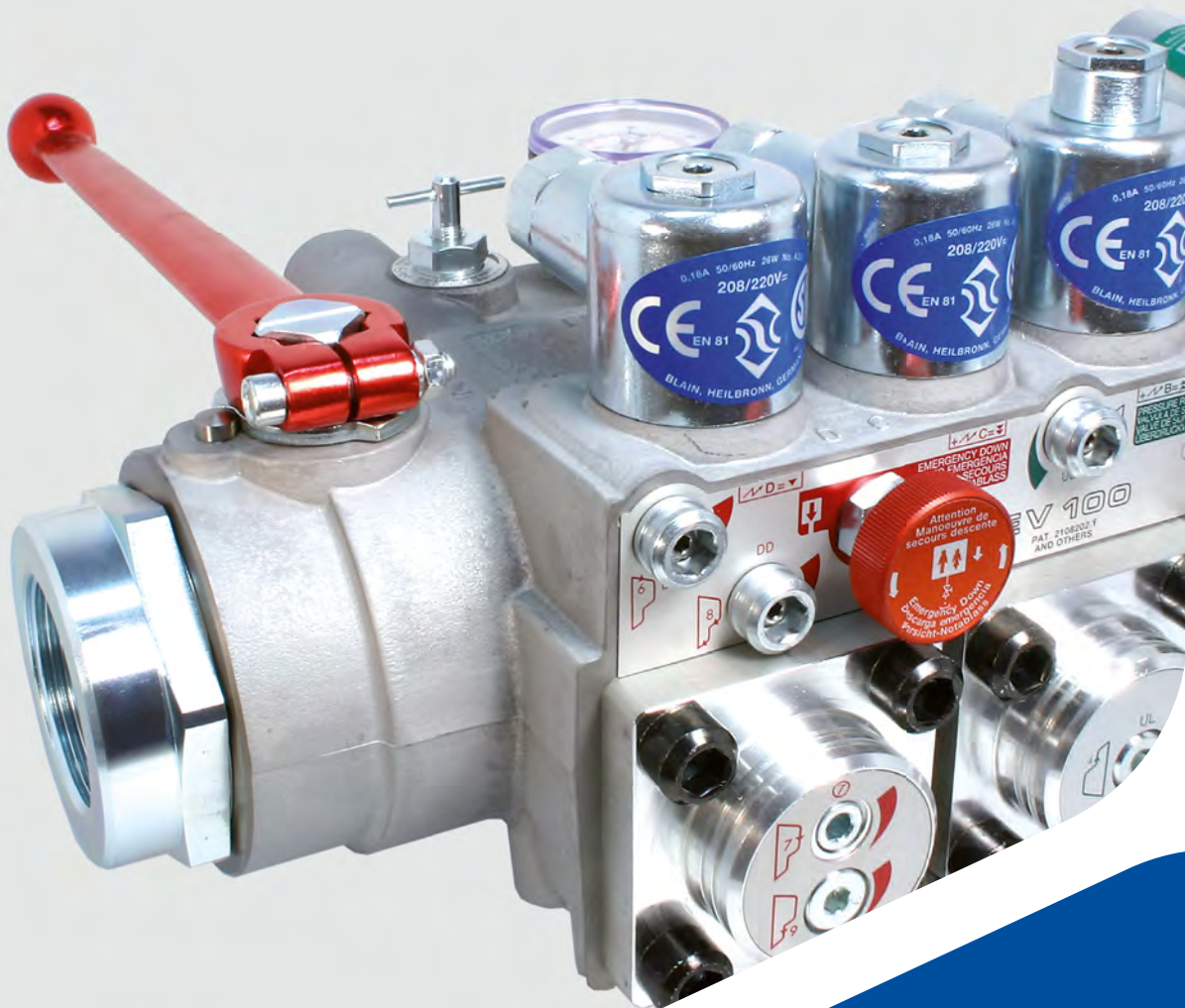


BLAIN VALVES FOR HYDRAULIC ELEVATORS

Excellence in Simplicity and Performance



**SERVICE
MANUAL**

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Service Manual

Elevator Valve EV & KV

!

Caution

Only qualified elevator mechanics are permitted to install and adjust elevator control valves and controllers.

Every Blain control valve is subjected to strong quality standards, from production, adjustment and testing, to final shipment.

This manual will provide assistance whenever servicing is required. If necessary, please contact our technical department, stating the valve number, which is engraved into the EV casting above the nameplate, as well as other related technical data.

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Elevator Valve - EV 100 3/4"

for Home Lifts



Control Elements

- A Solenoid (UP Stop)
- B Solenoid (UP Deceleration)
- C Solenoid (Down Deceleration)
- D Solenoid (Down Stop)
- H Manual Lowering
- S Relief Valve
- U By Pass Valve
- V Check Valve
- W Leveling Valve (Up)
- X Full Speed Valve (Down)
- Y Leveling Valve (Down)

Adjustments UP

- 1 By Pass
- 2 Up Acceleration
- 3 Up Deceleration
- 4 Up Leveling Speed
- 5 Up Stop

Adjustments DOWN

- 6 Down Acceleration
- 7 Down Full Speed
- 8 Down Deceleration
- 9 Down Leveling Speed

Pressure

- Pumpe
- Bypass Valve
- Up Leveling
- Tank
- Cylinder
- Down Valve
- Down Leveling



Éléments de commande

- A Electro-vanne 'arrêt' (en fin de montée)
- B Electro-vanne 'ralentissement' (montée)
- C Electro-vanne 'ralentissement' (descente)
- D Electro-vanne 'arrêt' (en fin de descente)
- H Descente de secours (homme mort)
- S Valve de sécurité
- U By-pass
- V Clapet anti-retour
- W Soupape montée petite vitesse
- X Soupape descente
- Y Soupape descente petite vitesse

Réglages MONTÉE

- 1 By-pass
- 2 Etrangleur de démarrage
- 3 Etrangleur de ralentissement
- 4 Réglage de petite vitesse
- 5 Etrangleur d'arrêt

Réglages DESCENTE

- 6 Etrangleur de démarrage
- 7 Réglage de grande vitesse
- 8 Etrangleur de ralentissement
- 9 Réglage de petite vitesse

Pression

- Pompe
- By-pass
- Montée petit vitesse
- Cuve
- Vérin
- Soupape descente
- Descente petite vitesse



Steuerelemente

- A Magnetventil (Halt oben)
- B Magnetventil (Abbremsen auf)
- C Magnetventil (Abbremsen unten)
- D Magnetventil (Halt unten)
- H Notablassventil
- S Überdruckventil
- U Umlaufkolben
- V Rückschlagventil
- W Schleichfahrtventil (auf)
- X Senkkolben
- Y Schleichfahrtventil (ab)

Einstellungen AUF

- 1 Umlaufeinstellung
- 2 Anfahrtdrossel
- 3 Abbremsdrossel
- 4 Schleichfahreinstellung
- 5 Haltedrossel

Einstellungen AB

- 6 Anfahrtdrossel
- 7 Senkfahreinstellung
- 8 Abbremsdrossel
- 9 Schleichfahreinstellung

Druck

- Pumpe
- Umlaufkolben
- Schleichfahrt (Auf)
- Tank
- Zylinder
- Senkkolben
- Schleichfahrt (Ab)



Elementos de mando

- A Válv. magnética 'parada' (arriba)
- B Válv. magnética 'frenado' (subida)
- C Válv. magnética 'frenado' (bajada)
- D Válv. magnética 'parada' (abajo)
- H Válv. parada de urgencia (manual)
- S Válv. de seguridad
- U Válv. de desviación
- V Válv. de retención
- W Válv. de subida lentísima
- X Válv. de bajada
- Y Válv. de bajada lentísima

Ajustes SUBIDA

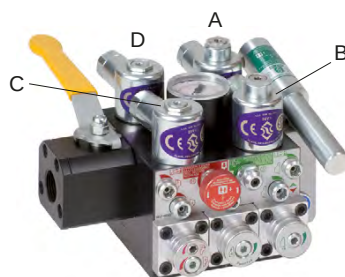
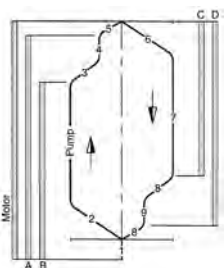
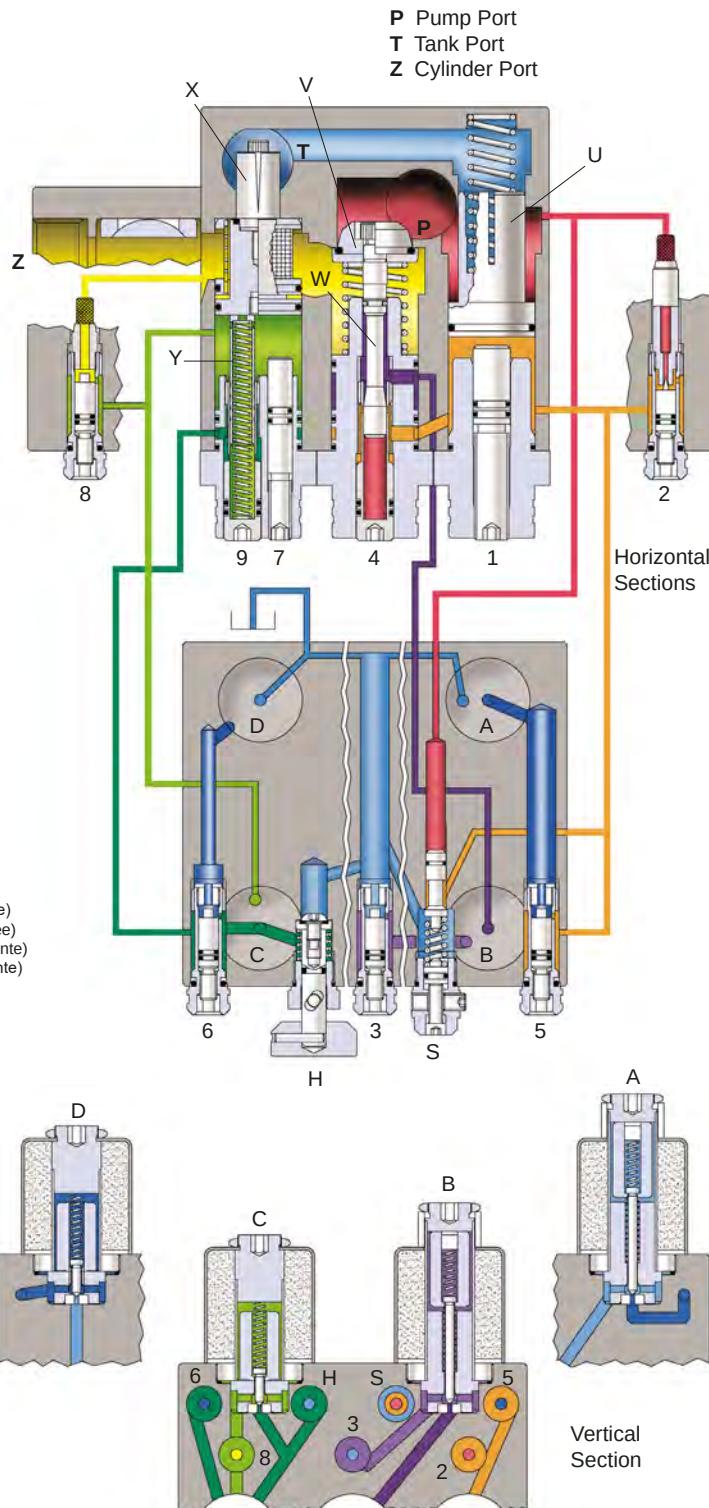
- 1 Desviación
- 2 Arranque
- 3 Frenado
- 4 Recorrido lentísimo
- 5 Parada

Ajustes BAJADA

- 6 Arranque
- 7 Recorrido en bajada
- 8 Frenado
- 9 Recorrido lentísimo

Presión

- Bomba
- Válvula de desviación
- Subida lentísima
- Tanque
- Cilindro
- Válvula de bajada
- Bajada lentísima



Elevator Valve

EV 100 1½", 2", 2½"

P Pump Port
T Tank Port
Z Cylinder Port



Control Elements

- A Solenoid (UP Stop)
- B Solenoid (UP Deceleration)
- C Solenoid (Down Deceleration)
- D Solenoid (Down Stop)
- H Manual Lowering
- S Relief Valve
- U By Pass Valve
- V Check Valve
- W Leveling Valve (Up)
- X Full Speed Valve (Down)
- Y Leveling Valve (Down)

Adjustments UP

- 1 By Pass
- 2 Up Acceleration
- 3 Up Deceleration
- 4 Up Leveling Speed
- 5 Up Stop

Adjustments DOWN

- 6 Down Acceleration
- 7 Down Full Speed
- 8 Down Deceleration
- 9 Down Leveling Speed

- Pressure**
- Pumpe
 - Bypass Valve
 - Up Leveling
 - Tank
 - Cylinder
 - Down Valve
 - Down Leveling



Eléments de commande

- A Electro-vanne 'arrêt' (en fin de montée)
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- C Electro-vanne 'ralentissement' (descente)
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- H Descente de secour (homme mort)
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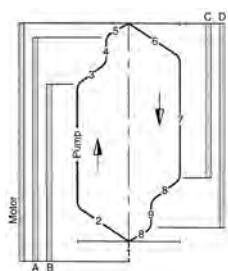
Réglages MONTÉE

- 1 By-pass
- 2 Etrangleur de démarrage
- 3 Etrangleur de ralentissement
- 4 Réglage de petite vitesse
- 5 Etrangleur d'arrêt

Réglages DESCENTE

- 6 Etrangleur de démarrage
- 7 Réglage de grande vitesse
- 8 Etrangleur de ralentissement
- 9 Réglage de petite vitesse

- Pression**
- Pompe
 - By-pass
 - Montée petit vitesse
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 - Vérin
 - Soupape descente
 - Descente petite vitesse



Steuerelemente

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- U Umlaufkolben
- V Rückschlagventil
- W Schleifschichtventil (auf)
- X Senkkolben
- Y Schleifschichtventil (ab)

Einstellungen AUF

- 1 Umlaufeinstellung
- 2 Anfahrrossel
- 3 Abbremsdrossel
- 4 Schleifschichteinstellung
- 5 Haltdrossel

Einstellungen AB

- 6 Anfahrtdrossel
- 7 Senkfahrteinstellung
- 8 Abbremsdrossel
- 9 Schleifschichteinstellung

- Druck**
- Pumpe
 - Umlaufkolben
 - Schleifschicht (Auf)
 - Tank
 - Zylinder
 - Senkkolben
 - Schleifschicht (Ab)



Elementos de mando

- A Válv. magnética 'parada' (arriba)
- B Válv. magnética 'frenado' (subida)
- C Válv. magnética 'frenado' (bajada)
- D Válv. magnética 'parada' (abajo)
- H Válv. parada de urgencia (manual)
- S Válv. de seguridad
- U Válv. de desviación
- V Válv. de retención
- W Válv. de subida lentísima
- X Válv. de bajada
- Y Válv. de bajada lentísima

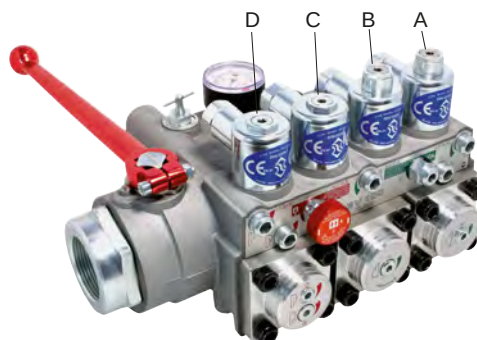
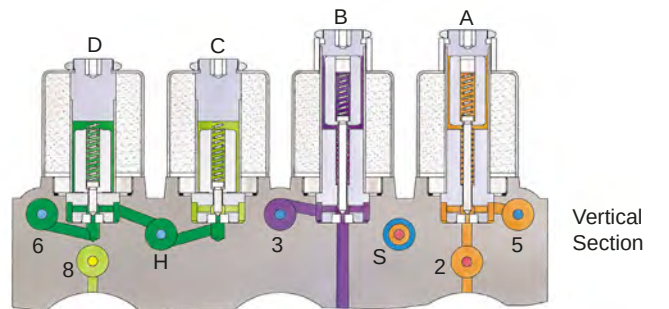
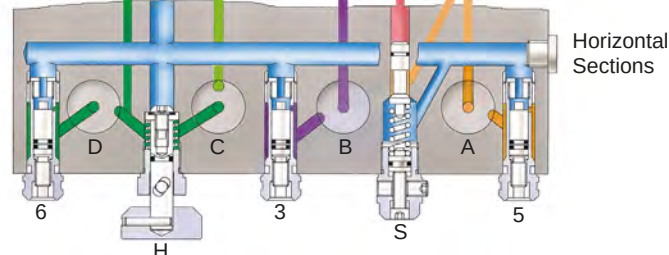
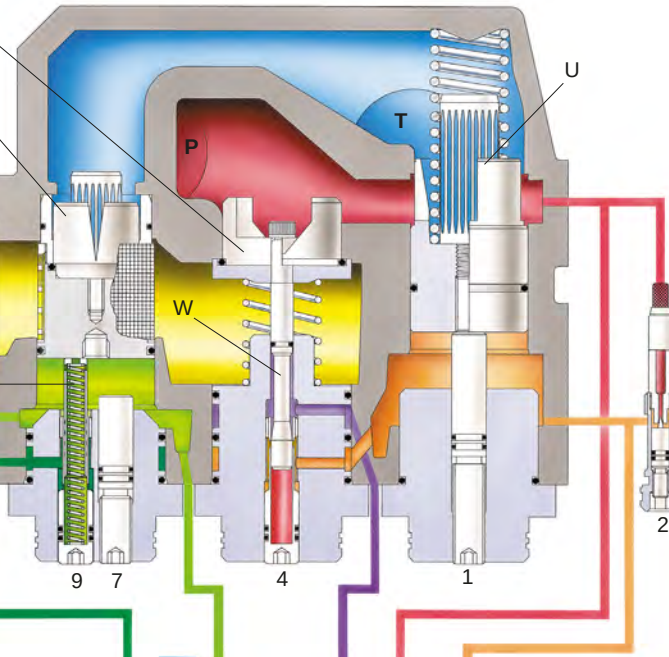
Ajustes SUBIDA

- 1 Desviación
- 2 Arranque
- 3 Frenado
- 4 Recorrido lentísimo
- 5 Parada

Ajustes BAJADA

- 6 Arranque
- 7 Recorrido en bajada
- 8 Frenado
- 9 Recorrido lentísimo

- Presión**
- Bomba
 - Válvula de desviación
 - Subida lentísima
 - Tanque
 - Cilindro
 - Válvula de bajada
 - Bajada lentísima



Quick adjustment procedure

Solenoid Coils

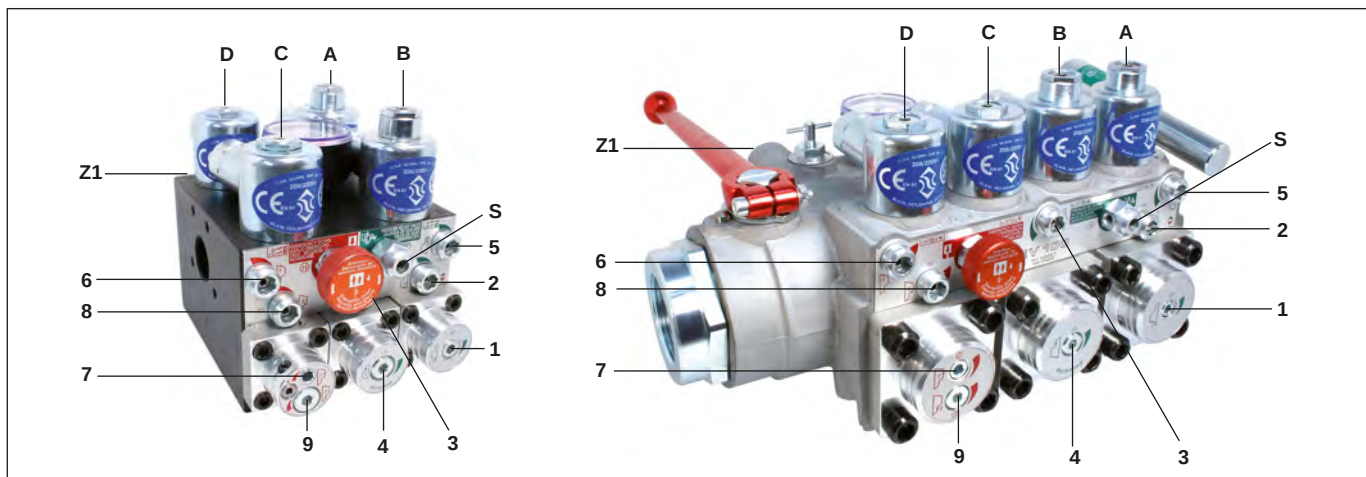
During adjustment of the EV 100 valve, instead of making a full floor to floor travel to check operation, much time can be saved by removing the securing nuts of the coil and switching to deceleration or to acceleration by lifting or replacing the appropriate coil by hand, allowing several adjustment corrections during one car travel between floors.

Caution: Once removed from the solenoid tube, the energised coil will begin to overheat after about 10 s. If necessary, to slow the rate of heating, place an 14 or 17 mm socket key or similar steel rod as core thru the coil. Do not lay an energised coil to one side, otherwise it may overheat unnoticed.

If the coil becomes too hot to hold, it must be replaced, back over the solenoid tube and any further adjustment carried out with the elevator making normal floor to floor runs.

Car not visible from Machineroom

If the car cannot be seen during adjustment of the valve, the acceleration and deceleration times can be heard from the change of the turbulent noise within the valve as the speed of the car changes. With no load in the car, the duration of the speed changes should be about 2.5 seconds. This applies to adjustments 2, 3, 6 and 8.



Up Travel (empty car)

PRE-SETTINGS	EV 100 ¾"	EV 100 1½" - EV 100 2½"
Adjustment No. 1 level with flange face		5 mm Socket key
Adjustment No. 2 all the way 'in'	then 1.5 turns 'out'	then 2 turns 'out'
Adjustment No. 3 all the way 'in'	then 1.5 turns 'out'	then 2.5 turns 'out'
Adjustment No. 4 level with flange face		5 mm Socket key
Adjustment No. 5 all the way 'in'	then 1.5 turns 'out'	then 2.5 turns 'out'
Adjustment No. S all the way 'in'	then 1.5 turns 'out'	then 1.5 turns 'out'

1. Pilot Pressure Setting

Disconnect coil A. Energise Motor (pump).

If the car does not move, turn No. 1 'in' until the car begins to move, turn No. 1 'out' until the car stops, then back out again ½ turn. The car remains standing still.

DO NOT UP-LEVEL WITH THIS ADJUSTMENT! Between full and empty car, levelling speed differences would be extreme.

2. Up Acceleration

Reconnect coil A. Start Motor and energise coil A and B (normal 'up' call).

Observe the up acceleration. If it is too quick, turn No. 2 'in' ½ turn. If it is too long, turn No. 2 'out' ½ turn.

Repeat until acceleration is satisfactory. Acceleration time should be about 2.5 s.

3. Up Deceleration

With coil B still disconnected. Energise motor and coil A (normal 'up-level' call).

The car will travel upwards at levelling speed. Turn No. 3 'in' until the car starts to up level faster, then

turn No. 3 'out' until the original levelling speed is observed. Reconnect coil B and place a normal up call.

Observe the deceleration of the car. If it is too long, turn No. 3 'out' ¼ turn; if it is too short, turn No. 3 'in' ¼ turn.

Repeat until deceleration is satisfactory. Deceleration time should be about 2.5 s.

Quick adjustment procedure

4. Up Levelling

Disconnect coil **B**. Energise Motor and coil **A** (normal 'up-level' call).

With adjustment No. **4** level with the face of the flange the car will up level. If the levelling speed is too fast, turn No. **4** 'in' until the speed is as required. If the speed is too slow, turn No. **4** 'out'. Recommended speed 6 cm/s.

5. Up Soft Stop

Disconnect coil **A**. Energise Motor.

The car should not move. Turn No. **5** 'in' until the car starts upwards then turn No. **5** 'out' until the car stops.

Reconnect coil **A**. Energise Pump-Motor and **A**. The car will travel upwards at levelling speed.

Lift **A** coil by hand briefly and observe the stopping of the car. If the stop is too hard turn No. **5** 'in' ¼ turn.

If the stop is too soft, turn No. **5** 'out', ¼ turn. Repeat until the stop is satisfactory.

S Pressure Relief Valve

Turn **S** screw 'out' until about 2 mm of the screw head is showing. Close the ball valve in the cylinder line and open the manual lowering **H** to lower valve pressure down to zero. Place an up call, energising motor and coils **A** and **B**. The relief pressure will show on the pressure gauge.

To increase the relief valve setting, turn **S** 'in'.

To decrease the relief valve setting, turn **S** 'out', then open the manual lowering for ½ second with the pump still running to release locked-in pressure, before observing the pressure gauge reading.

PRE-SETTINGS		EV 100 ¾"	EV 100 1½" - EV 100 2½"	
Adjustment No. 7	3 mm under the flange face			5 mm Socket key
Adjustment No. 8	all the way 'in'	then 1 turns 'out'	then 1.5 turns 'out'	3 mm Socket key
Adjustment No. 9	level with flange face			5 mm Socket key
Adjustment No. 6	all the way 'in'	then 1.5 turns 'out'	then 1.5 turns 'out'	3 mm Socket key

7. Down Full Speed

Place down call (coils **C** and **D** energised).

Observe full down speed. Turn No. **7** 'in' for slower, 'out' for faster speed.

8. Down Deceleration

Place down call (coils **C** and **D** energised).

As the car approaches full speed, remove coil **D** by hand briefly from the solenoid and observe the deceleration of the car.

If the deceleration is too long, turn No. **8** 'out' ¼ turn; if it is too short, turn No. **8** 'in' ¼ turn.

Caution. Never close adjustment & completely(in). This will cause damage to the car.

Repeat until deceleration is satisfactory. Deceleration time should be about 2.5 secs.

9. Down Levelling Speed

Disconnect coil **C**. Place down call (**D** energised).

Observe down levelling speed. Turn No. **9** 'in' for slower, 'out' for a fast down levelling speed.

Recommended speed 6 cm/s.

Note: The manually operated down speed is 6cm/s.

6. Down Acceleration

Turn No. **6** all the way 'in'. Place down call (coils **C** and **D** energised).

The car will not move. Turn No. **6** 'out' slowly until the car accelerates downwards.

If the acceleration is too long, turn No. **6** 'out' ¼ turn. If it is too short, turn No. **6** 'in' ¼ turn.

Acceleration time should be about 2.5 s.

H Emergency Lowering

The manually operated emergency down speed and the **D** coil operated down levelling speed are the same.

Down Stop

When solenoid **D** is de-energised with solenoid **C** remaining de-energised, the car will stop according to the setting of adjustment 8 and no further adjustment will be required.

KS Slack Rope Valve

The KS is adjusted with a 3 mm Socket Key by turning the screw **K** 'in' for higher pressure and 'out' for lower pressure. With **K** turned all the way 'in', then half a turn back out, the unloaded car should descend when the **D** solenoid alone is energised. Should the car not descend, **K** must be backed off until the car just begins to descend, then backed off a further half turn to ensure that with cold oil, the car can be lowered as required.

Switch Distances

Recommended distances between leveling and stop switches

Elevator Speed	Switch Distance	Elevator Speed	Switch Distance
mtrs/sec.	approx. cm	ft/min.	approx. inches
0,10	5	20	2
0,15	10	30	4
0,20	15	40	6
0,25	18	50	7
0,30	25	60	9
0,35	30	70	12
0,40	40	80	16
0,45	46	90	18
0,50	50	100	20
0,55	58	110	23
0,60	70	120	28
0,70	80	140	31
0,80	95	160	36
0,90	105	180	41
1,00	120	200	48

With no load in the car, the deceleration time should be 2 to 2.5 secs. from full speed to levelling speed.
The levelling time should be 1 to 2 secs.

Accurate landing can be affected by different factors as follows:

- If the levelling speed is fast i.e. 0,1 m/sec (20 ft/min), landing will not be as accurate as when the levelling speed is slower i.e. 0,05 m/sec (10 ft/min).
- If the soft stop adjustment '5' is set too soft, stopping will be less accurate as when '5' is set for a quicker stop.
- Particularly when the mechanic can not see the operation of the elevator car, it is possible that the elevator has not finished decelerating from fast speed before reaching the floor. In other words, the elevator has not slowed down to its correct levelling speed before the stop switch is actuated.
Usually, the levelling operation can be observed through the crack in the car doors. Alternatively, in the machine room, the turbulent noise within the valve during levelling can be heard and should last 1 to 2 secs. following 2 to 2,5 secs. deceleration time with no load in the car.
- A difference in landing accuracy between the elevator being loaded and unloaded, can be due to the car under load, leaning to one side by several millimeters causing an alteration in the operating position of the stop switch by some centimetres.

Problem	Possible cause	Recommended
No Up-Start (Elevator remains at floor)	Test: Turn adjustment 5 all the way in. If the elevator now starts upwards the problem is at solenoid A .	
	Solenoid A : not energised or voltage too low.	See Ⓐ below.
	Solenoid A : tube not screwed down tight.	Tighten Solenoid A tube.
	Solenoid A : Dirt or damage between needle AN and seat AS .	Clean or change needle and seat.
	Adjustment 2 not far enough open.	Turn out adjustment 2 .
	Adjustment 1 too far back (open). Not enough pilot pressure.	Turn in adjustment 1 with the pump running.
	Pressure relief valve S is set too low.	Set relief valve higher. (turn in)
	Adjustment 8 turned in too far (car sits on the buffer).	Turn out adjustment 8 .
	Bypass flow guide U is too large.	Insert smaller bypass flow guide (see flow guide charts at EV catalogue).
	Pump running in the wrong direction.	Check motor direction and install the pump correctly.
	The pump connection flange is leaking excessively.	Seal the pump connection.
	The pump is undersize, worn or crack in the housing.	Select bigger pump or replace pump.
	Test: If by turning adjustment 1 with the pump running the pressure does not rise above 5 bar, even with a smaller bypass valve inserted, the problem should be sought at the pump.	
Up-Start, but no Full Speed	Test: Turn adjustment 3 all the way in. If the elevator now travels upwards at full speed the problem is at solenoid B .	
	Solenoid B not energised or voltage too low.	See Ⓐ below.
	Solenoid B tube not screwed down tight.	Tighten Solenoid B tube.
	Solenoid B : Dirt or damage between needle AN and seat AS .	Clean or change needle and seat.
	The pump connection flange is leaking excessively.	Seal the pump connection.
	The pump is undersize or worn.	Select bigger pump or replace pump.
Up-Start too hard	Adjustment 1 turned in too far.	Turn out adjustment 1 .
	Adjustment 2 turned out too far.	Turn in adjustment 2 .
	Bypass flow guide U too small (slots too narrow).	Change to flow guide with wider slots.
	O-Ring UO on Bypass Valve U is leaking.	Change O-Ring → see EV Spare Parts List.
	Star to Delta motor switch period is too long.	0.2-0.3 sec. is sufficient.
	Excessive friction on the guide rails or in the cylinder head.	Can not be eliminated thru valve adjustment.
No deceleration into levelling speed	Solenoid B does not de-energise.	Lift coil to check magnetic pull. See Ⓐ below. Slow down switch possibly set to high (late).
	Adjustment 3 turned in too far.	Turn out adjustment 3 . Turn in adjustment 2 .
	O-Ring UO on Bypass Valve U is leaking.	Change O-Ring → see EV Spare Parts List.
Levelling too fast	Adjustment 4 too far screwed out.	Turn in adjustment 4 to about 0.05 m/s levelling speed.
Deceleration into levelling speed but overtravel of floor level	Solenoid A is de-energised too late.	Lift coil to check pull. See Ⓐ below. Switch position in the shaft.
	Adjustment 5 turned in too far.	Turn out adjustment 5 .
	Adjustment 1 turned in too far.	Turn out adjustment 1 .
	Up levelling speed too high.	Turn in adjustment 4 to about 0.05 m/s levelling speed.
Bypass-pressure not adjustable	Restriction on the return line.	Remove restriction; enlarge return line.
	Bypass flow guide U too small (slots too narrow).	Change to flow guide with wider slots.
Elevator stops before reaching the floor (no levelling)	Solenoid A and B reversed.	Swap solenoid A and B . See Ⓐ below.
	Up levelling speed too slow.	Turn out adjustment 4 .
	Middle O-Ring FO of flange 4F is leaking.	Change O-Ring → see EV Spare Parts List.

⚠ **Valves are already adjusted and tested.** Check electrical operation before changing valve settings. Test that the correct solenoid is energised, by removing nut and raising solenoid slightly to feel pull.

Ⓐ For checking the operation of the solenoids, remove the top nuts. By lifting the coils a few millimetres, the magnetic pull of the coil can be felt. For testing, the operation of the elevator car can also be controlled by lifting and replacing the coil.

If the coil gets too hot, the coil has to be mounted onto the solenoid and the following adjustments have to be carried out on normal travels from floor to floor.

Standard settings: Adjustments **1** approx. level with flange face. Adjustment **4** 1mm above flange face (chamfer of adjustment screw is visible). Up to two turns in either direction may then be necessary. Adjustments **2**, **3** & **5** all the way in (clockwise) then for EV ¾": adjustments **2** & **3** 1.75 turns out (c-clockwise) and adjustment **5** 1.25 turns out (c-clockwise), for EV 1 ½" – 2 ½": adjustments **3** & **5** two and half turns out (c-clockwise), adjustment **2** two turns out. Small final adjustments may be necessary.



Problem	Possible cause	Recommended
No Down Start	Solenoid D not energised or voltage too low.	Lift coil to check magnetic pull. See Ⓐ below.
	Adjustment 6 turned in too far.	Turn out adjustment 6 .
	Adjustment 8 turned out too far.	Turn in adjustment 8 cautiously. Attention: Danger of travelling through.
	O-Ring UO on Down Valve X is leaking.	Change O-Ring → see EV Spare Parts List.
No full speed	Solenoid C not energised or voltage too low.	Lift coil to check magnetic pull. See Ⓐ below.
	Adjustment 7 turned in too far.	Turn out adjustment 7 .
	Down Valve flow guide X too small.	Check insert size (see flow guide charts page 6)
	Filter on solenoid D contaminated.	Clean filter.
No down levelling. Elevator stops before floor level	Solenoid C and D reversed.	Lift coil to check magnetic pull. See Ⓐ below.
	Adjustment 9 turned in too far.	Turn out adjustment 9 to about 0.05 m/s levelling speed.
	Spring 9F in adjustment 9 is broken or down levelling valve Y is blocked.	Replace the spring or clean the down levelling valve.
	Pressure setting of KS too high.	Turn adjustment KS out.
No deceleration into levelling speed. Elevator travels though floor level	Adjustment 8 turned in too far. Filter of adjustment 8 blocked or adjustment 8 is damaged.	Turn out adjustment 8 about ½ turn, clean the filter or replace adjustment 8 .
	Adjustment 9 turned out too far.	Turn in adjustment 9 to about 0.05 m/s levelling speed.
	Solenoid valve C contaminated	Clean or change needle and seat.
	Inner O-Ring FO on flange 7F is leaking.	Change O-Ring → see EV Spare Parts List.
Elevator sinks quickly	Solenoid D tube not screwed down tight.	Tighten Solenoid D tube.
	Adjustment 8 turned in too far.	Turn out adjustment 8 about ½ turn.
	Damage on down valve X or check valve V .	Check parts and change them if necessary.
Elevator sinks slowly due to inner leakage (Relevelling)	For possible down leakage points, see technical documentation "System Leakage".	Replace one seal at a time and test before proceeding to the next point of possible leakage, if still necessary.
	Solenoid D contaminated or damaged.	Clean solenoid D or replace needle DN and seat DS .
	O-Ring XO of Down Valve X is leaking.	Change O-Ring → see EV Spare Parts List. When Down Valve is compensated, replace Down Valve.
	O-Ring VO of Check Valve V is leaking.	Change Check Valve → see EV Spare Parts List.
	O-Ring WO of Check Valve V is leaking.	Change O-Ring → see EV Spare Parts List.
	Inner O-Ring FO on flange 4F is leaking.	Change O-Ring → see EV Spare Parts List.
	O-Ring HO of Manual Lowering H is leaking.	Replace Manual Lowering.
Elevator sinks due to inner leakage of auxiliary equipment	HP : Handpump is leaking.	Seal the hand pump.
	HX/MX : Adjustment 8M turned in too far.	Turn out adjustment 8M .
	HX/MX : Down valve 9M is leaking. Dirt or damage between the needle DN and seat DS .	Clean or change needle and seat.
	HX/MX : O-Ring XO of Down Valve YM is leaking.	Change O-Ring → see EV Spare Parts List.
	HX/MX : Manual Lowering is leaking (HX/MX).	Replace Manual Lowering.
	Contraction of oil during cooling especially from 35°C or above.	Consider oil cooler if hot oil is a problem.
	Micro Drive MD , Door Lock Valve L10 or L20 are leaking.	When possible isolate and check.

⚠ **Valves are already adjusted and tested.** Check electrical operation before changing valve settings. Test that the correct solenoid is energised, by removing nut and raising solenoid slightly to feel pull.

Ⓐ For checking the operation of the solenoids, remove the top nuts. By lifting the coils a few millimetres, the magnetic pull of the coil can be felt. For testing, the operation of the elevator car can also be controlled by lifting and replacing the coil.

If the coil gets too hot, the coil has to be mounted onto the solenoid and the following adjustments have to be carried out on normal travels from floor to floor.

Standard settings: Adjustments **7** & **9** approx. level with flange faces. Up to two turns in either direction may then be necessary. Adjustments **6** & **8** all the way in (clockwise) then for EV ¾", adjustment **8** one turn and adjustment **6** two turns out (c-clockwise), for EV 1 ½" – 2 ½", adjustment **8** 1.5 turns and adjustment **6** 2.5 turns out (c-clockwise). Small final adjustments may be necessary.

EV System Leakage (re-levelling)

Solenoid Valves

O-Ring-Size

No.	¼"	1 ½"	2 ½"
FO	26x2P	47x2.5P	58x3P *
EO	9x2P	9x2P	9x2P
UO	26x2V	39.34x2.62V	58x3V
WO	5.28x1.78V	5.28x1.78V	5.28x1.78V
VO	23x2.5V	42x3V	60x3V **
TO	5.28x1.78P	9x2P	9x2P
XO	13x2V	30x3V	47x3V
HO	5.28x1.78V	5.28x1.78V	5.28x1.78V
SO	5.28x1.78P	5.28x1.78P	5.28x1.78P
MO	26x2P	26x2P	26x2P

* FO by 4F 2 ½" is 67x2.5P
 ** 90 Shore
 O-Ring: V=FKM-Viton
 P=NBR-Perbunan

Adjustments

Replace possible leaking parts (DS & DN, XO, VO & WO, FO and HO) in the order of probabilities 1 - 5.
 Replace part 1 and check if the valve is leakproof now.
 Replace part 2 only if the valve is still leaking, etc.

Flow Valves

EV Spare Parts List

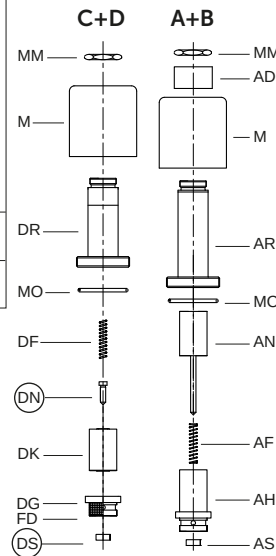
Pos.	No.	Item
1	FS	Lock Screw - Flange
	FO	O-Ring - Flange
	1F	Flange - By Pass
	1E	O-Ring - Adjustment
	EO	Adjustment - By Pass
	UO	O-Ring - By Pass Valve
	U	By Pass Valve
2	UD	Noise Suppressor
	UF	Spring - By Pass
2	2	Adjustment - Up Acceleration
3	3	Adjustment - Up Deceleration
4	EO	O-Ring - Adjustment
	4E	Adjustment - Up Levelling
	4F	Flange - Check Valve
	FO	O-Ring - Flange
	VF	Spring - Check Valve
	WO	Up-Levelling Valve
	VO	O-Ring - Up Levelling Valve
	V	Check Valve
	W6	Screw - Check Valve
	3	Adjustment - Up Stop
6	3	Adjustment - Down Acceleration
7	7F	Flange - Down Valve
	FO	O-Ring - Flange
	7O	O-Ring - Adjustment
	7E	Adjustment - Down Valve
	UO	O-Ring - Down Valve
	XO	Seal - Down Valve
	X	Down Valve
	XD	Noise Suppressor
8	F	Main Filter
	8	Adjustment - Down Deceleration
9	9E	Adjustment - Down Levelling
	EO	O-Ring - Adjustment
9F	9F	Spring - Down Valve
	Y	Down Levelling Valve
H	H	Manual Lowering - Self Closing
	HO	Seal - Manual Lowering
S	SE	Adjustment - Screw
	SM	Hexagonal
	MS	Grub Screw
	SO	O-Ring - Nipple
	SZ	Nipple
A+B	SF	Spring
	SK	Piston
	MM	Nut - Solenoid
	AD	Collar - Solenoid
	M	Coil - Solenoid (indicate voltage)
C+D	AR	Tube - Solenoid 'Up'
	MO	O-Ring - Solenoid
	AN	Needle - 'Up'
	AF	Spring - Solenoid 'Up'
	AH	Seat Housing - 'Up'
	AS	Seat - Solenoid 'Up'
	MM	Nut - Solenoid
	M	Coil - Solenoid (indicate voltage)
	DR	Tube - Solenoid 'Down'
	MO	O-Ring - Solenoid
	DF	Spring - Solenoid 'Down'
	DN	Needle - 'Down'
	DK	Core - Solenoid
	DG	Seat Housing with Screen-'Down'
	FD	Filter Solenoid
	DS	Seat - Solenoid 'Down'

No.	3/4"	O-Ring-Size	1 1/2"	2 1/2"
FO	26x2P	47x2.5P	58x3P *	
EO	9x2P	9x2P	9x2P	
UO	26x2V	39.34x2.62V	58x3V	
WO	5.28x1.78V	5.28x1.78V	5.28x1.78V	
VO	23x2.5V	42x3V	60x3V **	
7O	5.28x1.78P	9x2P	9x2P	
XO	13x2V	30x3V	47x3V	
HO	5.28x1.78V	5.28x1.78V	5.28x1.78V	
SO	5.28x1.78P	5.28x1.78P	5.28x1.78P	
MO	26x2P	26x2P	26x2P	

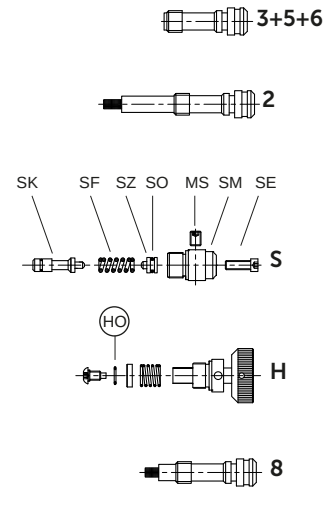
* FO by 4F 2 1/2" is 67x2.5P
** 90 Shore

O-ring: V = FKM - Viton
P = NBR - Perbunan

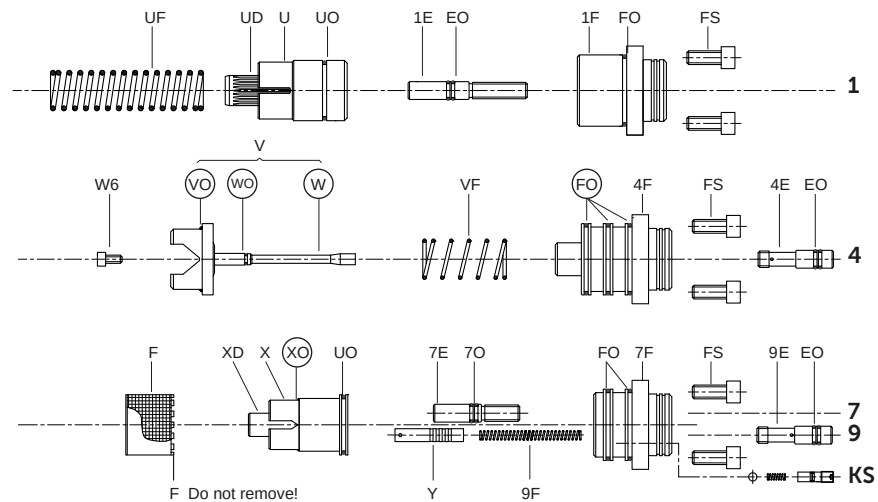
Solenoid Valves



Adjustments

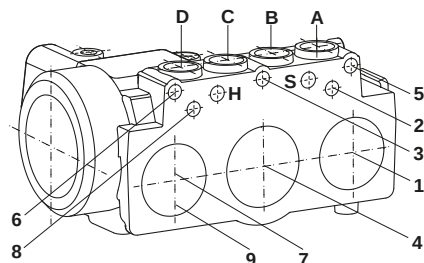
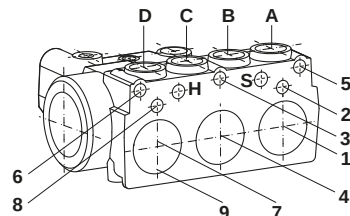
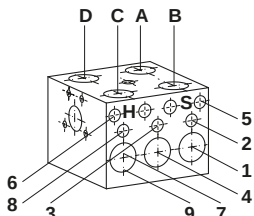


Flow Valves



In case of down leakage, replace and test in the following order: (DS) & (DN), (XO), (VO), (WO), (FO) + (HO).

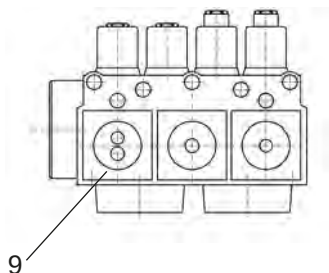
Taper threads: Do not exceed 8 turns of piping into the valve connections.



To order EV: Size (inch), valve type, state pump flow, empty car pressure (or flow guide size) and solenoid voltage.

Example order: 2"EV100, 380l/min, 18bar (empty), 110 AC or 2"EV100/4/110AC

Down Levelling Adjustment 9 Replacement



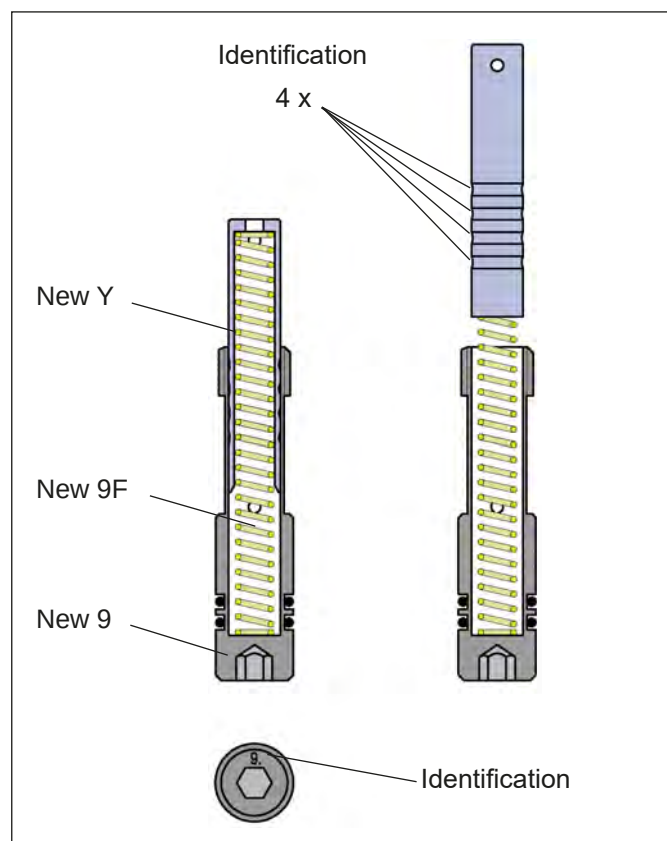
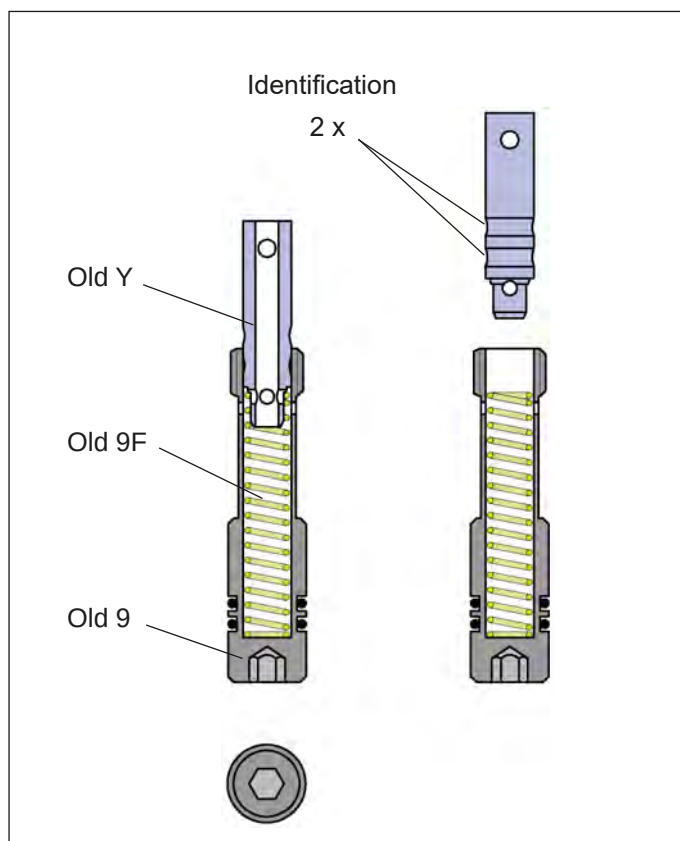
Old Type

1971 - 1999

Replacement not necessary
if operation is normal

New Type

from Jan. 2000



Advantages of new type

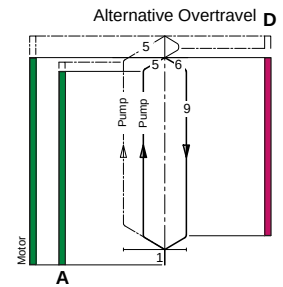
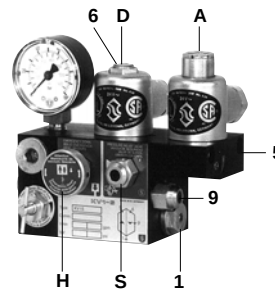
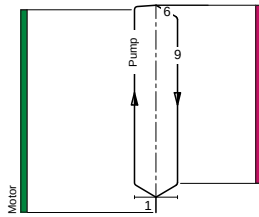
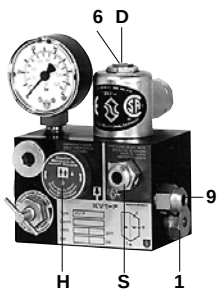
- Smoother deceleration
- Higher mechanical closing force
- Longer spring life
- Easier assembly

In the past, a small number of the original springs No. 9F have broken. Beginning January 2000, the design of the down levelling adjustment was modified to take a stronger spring.

The complete new adjustment is interchangeable with the original adjustment 9.

A broken spring 9 would cause the down levelling speed to be slower. No danger to passengers would arise as a consequence.

Residential Elevator Valves KV



Control Elements

- A Solenoid Up
- D Solenoid Down
- F Main Filter
- H Manual Lowering
- L Gauge Shut Off Cock
- U Bypass Valve
- V Check Valve
- Y Down Levelling Valve

Adjustments

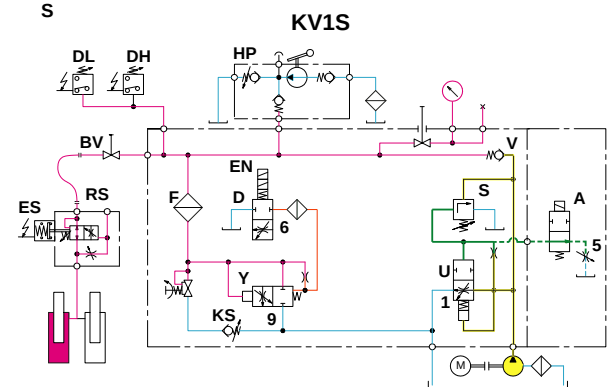
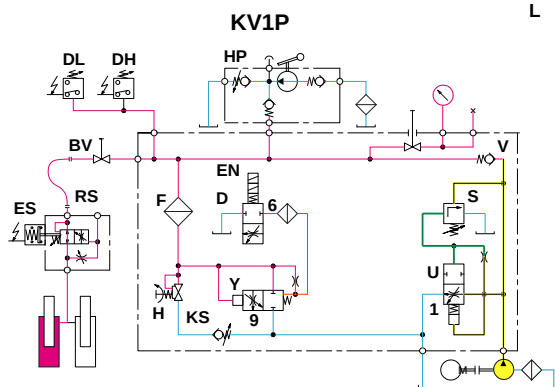
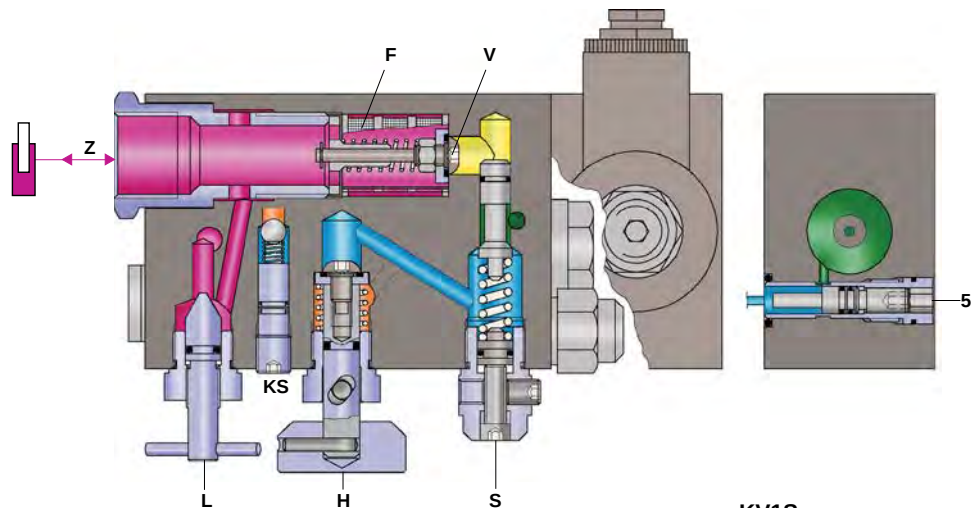
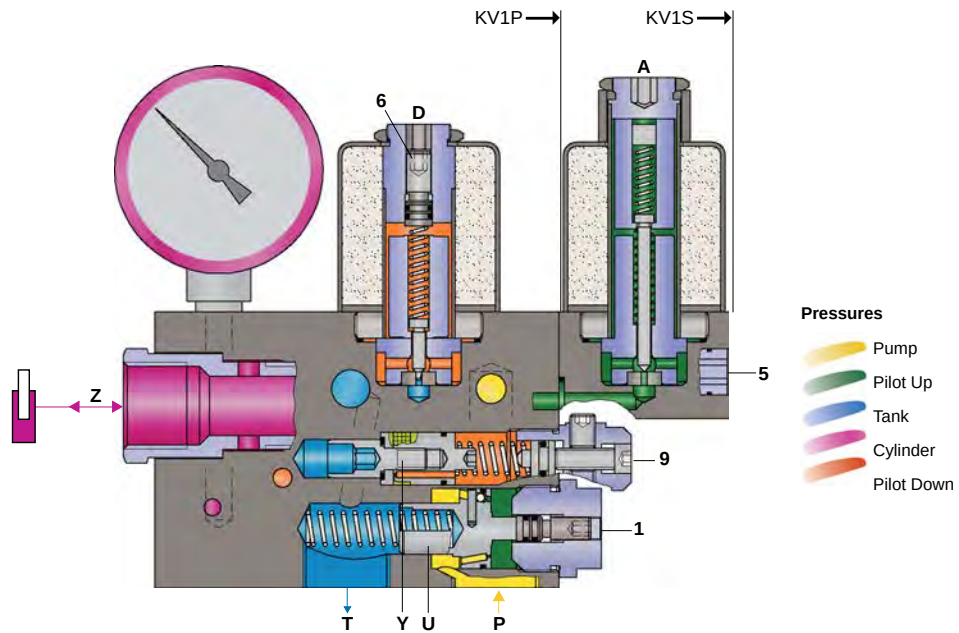
- 1 Bypass
- 5 Up Soft Stop
- 6 Down Acceleration
- 9 Down Speed
- S Relief Valve

Connections

- P Pump
- T Tank
- Z Cylinder

Options

- BV Ball Valve
- HP Hand Pump
- KS Slack Rope Valve
- DH High Pressure Switch
- DL Low Pressure Switch
- RS Pipe Rupture Valve
- ES Pipe Rupture Valve Switch



KV Elevator Control Valve

Trouble Shooting (2018)

UP Travel

Problem	Possible cause	Recommended
No Up-Start (Elevator remains at floor).	Test for KV1S and KV2S: Turn adjustment 5 all the way in, if the elevator now starts upwards the problem is at solenoid A .	
	Solenoid A not energised or voltage too low.	See Ⓐ below.
	Solenoid A tube not screwed down tight.	Tighten Solenoid A tube.
	Solenoid valve A : Dirt or damage between needle and seat.	Clean or change needle and seat.
	Orifice in bypass valve blocked.	Clean or change bypass valve U .
	Adjustment 1 too far back (open). Not enough pilot pressure (minimum 5 bar) or bypass flow guide too large (slots too wide). see*	With the pump running, turn adjustment 1 in, or if already too far in, insert smaller bypass flow guide (see the diagram in KV literature).
	Pressure relief valve S is set too low.	Set relief valve higher. Preadjustment all the way in and then 1½ turn out.
	Down valve 7 or 9 are open due to contamination in their orifices. (Especially if the elevator settles back on the buffers. Solenoid D is leaking.	Clean or replace down valves 7 (KV2 only) and 9 . Clean solenoid D .
	Pump running in the wrong direction.	Check motor direction and install the pump correctly.
	The pump connection flange is leaking excessively.	Seal the pump connection.
	The pump is undersize, worn or crack in the housing.	Select a bigger pump or replace the pump.
	Bypass flow guide too large.	Replace with smaller size.
	* Test: If by turning adjustment 1 with the pump running the pressure does not rise above 5 bar, even with a smaller bypass valve inserted, the problem should be sought at the pump.	
Up-Start too hard.	Adjustment 1 turned in too far.	Turn out adjustment 1 .
	Bypass flow guide U too small (slots too narrow).	Change to flow guide with wider slots.
	Star to delta motor switch period is too long.	0.2-0.3 sec. is sufficient.
	O-ring UO on the bypass valve U is leaking.	Change O-Ring → see KV Spare Parts List.
	Excessive friction on the guide rails or in the cylinder head.	Can not be eliminated through valve adjustment.
Elevator slows down but over travels the floor level.	Solenoid A (Up-stop) is de-energised too late.	See Ⓐ below.
	Adjustment 5 (Soft Stop) not far enough open (KV1S and KV2S).	Open further out.
	Adjustment 1 Bypass not far enough open and pump flow does not completely by-pass.	Open adjustment 1 two turns further out.
Relief-Valve not adjustable to lower value.	Adjustment 1 too far in.	Open adjustment 1 further out.
	½" pipe thread connection in return line T should not exceed 14 mm.	With tape threads, 4-6 threads of engagement is sufficient.
Elevator doesn't reach full speed.	Bypass piston doesn't close. Piston orifice is dirty <u>and</u> adjustment 1 turned in too far.	Clean the dirt / foreign particles in the by-pass piston orifice or change the piston and turn adjustment 1 out.

⚠ Valves are already adjusted and tested. Check electrical operation before changing valve settings. Test that the correct solenoid is energised, by removing nut and raising solenoid slightly to feel pull.

Ⓐ For checking the operation of the solenoids, remove the top nuts. By lifting the coils a few millimetres, the magnetic pull of the coil can be felt. For testing, the operation of the elevator car can also be controlled by lifting and replacing the coil.

If the coil gets too hot, the coil has to be mounted onto the solenoid and the following adjustments have to be carried out on normal travels from floor to floor.

Standard settings: Adjustment **1** level with flange faces. Adjustment **5** (KV1S & KV2S) level with flange faces.

Problem	Possible cause	Recommended
No Down Start (Elevator remains at floor).	Solenoid D not energised or voltage too low.	Lift coil to check magnetic pull. See Ⓐ below.
	Adjustment 6 turned in too far.	Turn out adjustment 6 .
	O-ring YO on down valve, leaking.	Replace O-ring YO .
KV2 only: Down start but no full speed	Solenoid C not energised or voltage too low.	Lift coil to check magnetic pull. See Ⓐ below.
	Adjustment 7 (Full speed down) turned in too far.	Turn out adjustment 7 .
	Down piston too small.	Insert the next size higher.
	Filter on Solenoid D contaminated.	Clean filter.
KV2 only: Down full speed but no down levelling.	Solenoids C and D reversed.	See Ⓐ below. Swap solenoid C and D .
	Adjustment 9 (Down levelling speed) turned in too far.	Turn out adjustment 9 .
	Solenoid C contaminated	Clean or change needle & seat.
	Solenoid C does not de-energise.	Check voltage on Solenoid C .
Only with KV2: Braking is too hard & stop is too soft. (The elevator travels below floor level).	Down piston 7 (Ø 0.2mm orifice; brass) & slow piston 9 (Ø 0.4mm orifice; steel) are reversed.	Swap piston 7 & 9 .
Elevator travels through floor level.	Down levelling speed 9 too fast.	Adjust to 0.05 m/s.
	Solenoid D is leaking.	Clean solenoid D ; turn seat upside down or replace needle & seat.
	Orifice in down flow guide X or down levelling flow guide Y is blocked or contaminated.	Replace piston.
Leakage (Elevator sinks).	Leak at N6 , S6 , XO , VO , WO or HO .	Replace and test in sequence.
	Other valves (ex. handpump) in the system, leaking.	Where possible, isolate and check.
	Contraction of oil during cooling, especially from 35°C or above.	Consider oil cooler to keep oil temperatures down.
	Solenoid D tube not screwed down tight.	Tighten Solenoid D tube.

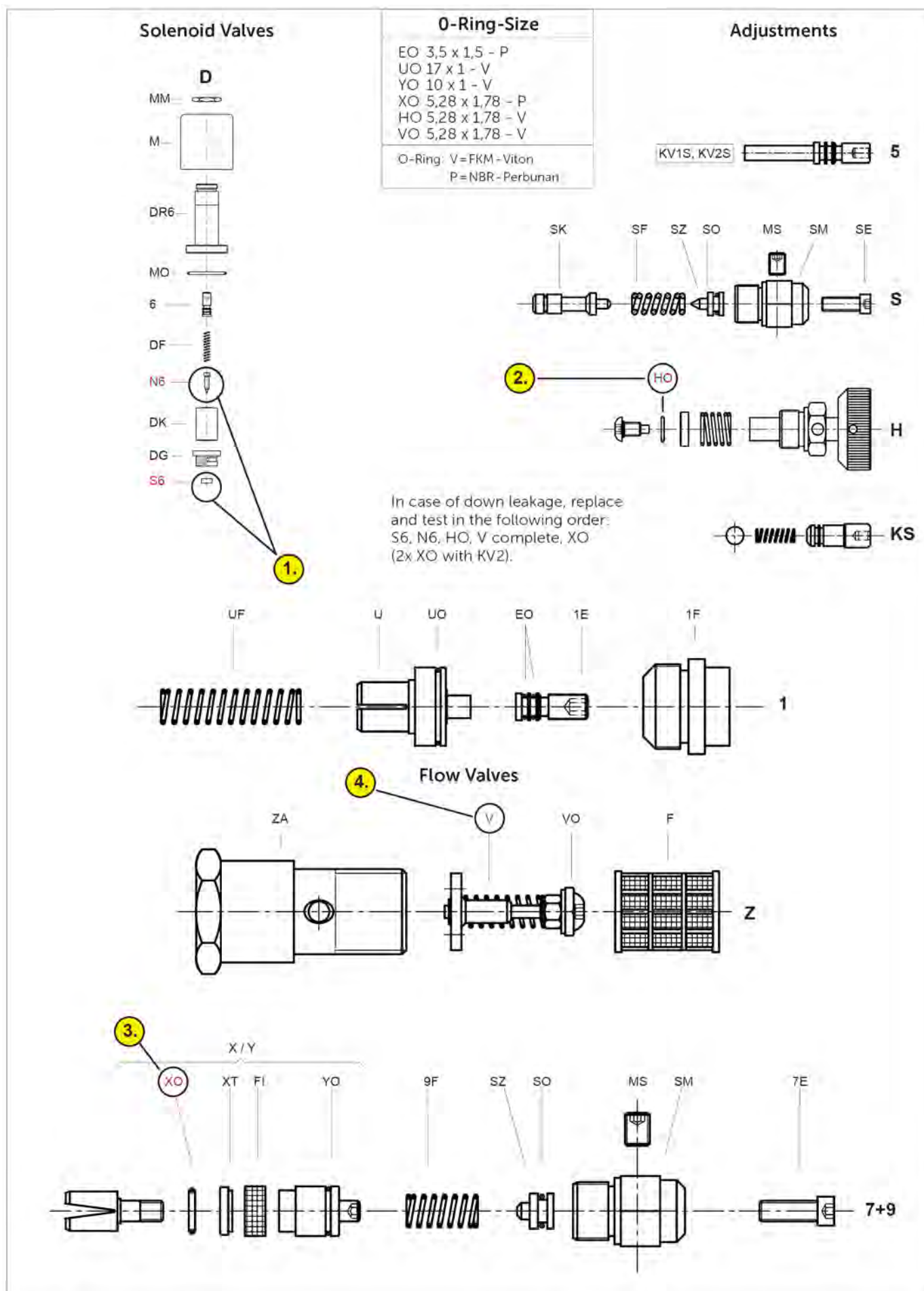
⚠ **Valves are already adjusted and tested.** Check electrical operation before changing valve settings. Test that the correct solenoid is energised, by removing nut and raising solenoid slightly to feel pull.

Ⓐ For checking the operation of the solenoids, remove the top nuts. By lifting the coils a few millimetres, the magnetic pull of the coil can be felt. For testing, the operation of the elevator car can also be controlled by lifting and replacing the coil.

If the coil gets too hot, the coil has to be mounted onto the solenoid and the following adjustments have to be carried out on normal travels from floor to floor.

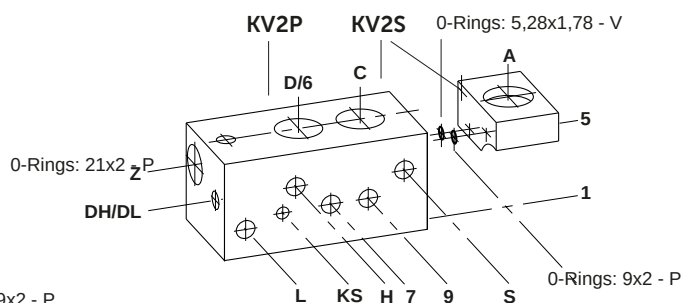
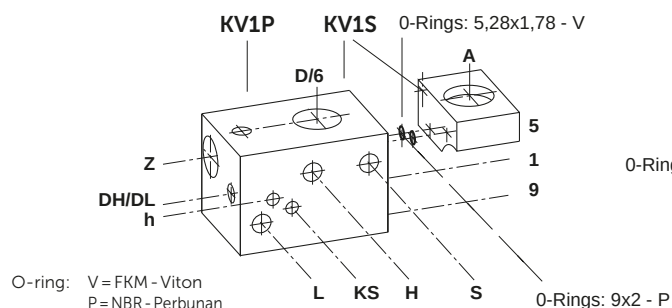
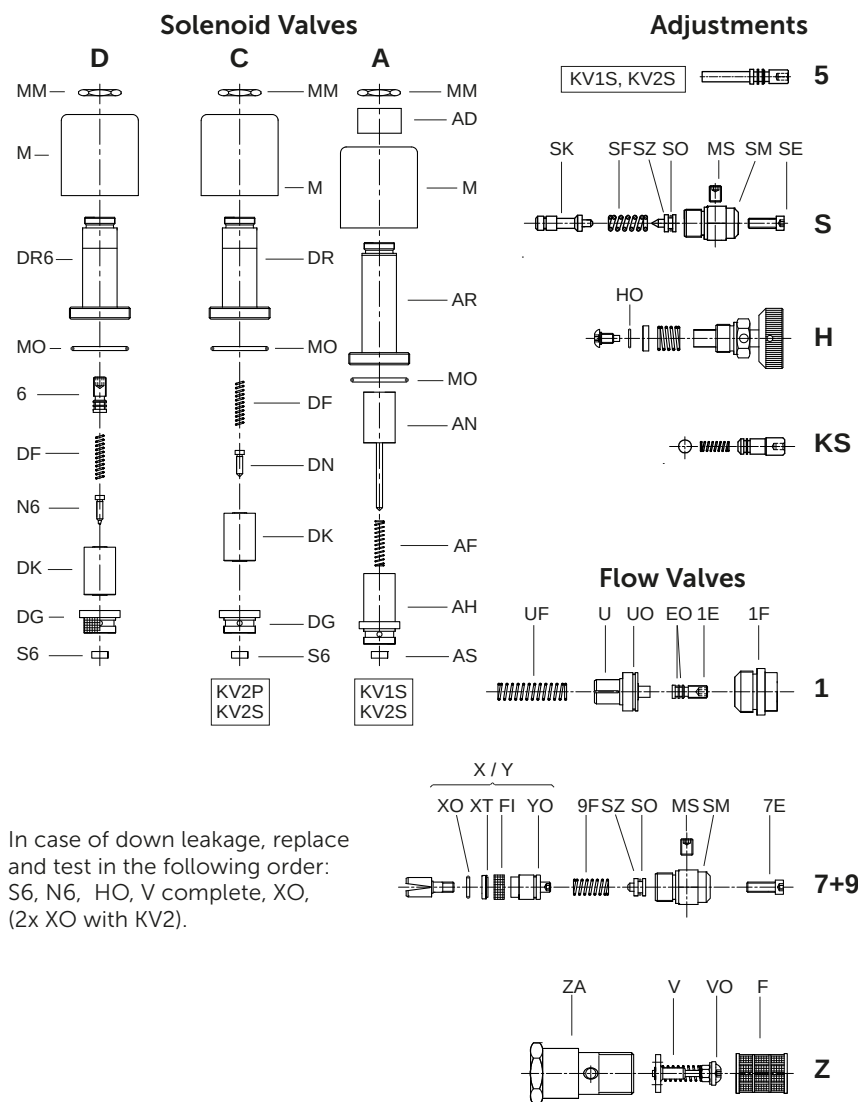
Standard settings: Adjustments **7** & **9**, screw heads level with the hexagon heads.

KV System Leakage (re-levelling)



KV Spare Parts List

Pos.	No.	Item	
1	1F	Flange - Bypass	
	1E	Adjustment - Bypass	
	EO	O-Ring - Adjustment (3,5x1,5 - P)	
	U	Flow Guide - Bypass	
	UO	O-Ring - Bypass (17x1 - V)	
	UF	Spring - Bypass	
5	5	Adjustment - Up Stop	
6	6	Adjustment - Down Acceleration	
7+9	7E	Adjustment - Down Valve	
	9F	Spring - Down Valve	
	YO	O-Ring - Flow Guide (10x1 - V)	
	XO	Seal - Flow Guide (5.28x1.78 - V)	
	XT	O-Ring Disc	
	FI	Filter - Down Valve	
	X	Down Flow Guide (Brass)	
	Y	Down Levelling Flow Guide (Steel) - KV2	
	Y	Down Flow Guide (Steel) - KV1	
	S	SE	Adjustment Screw - Relief Valve
SM		Hexagonal - Relief Valve	
MS		Locking Screw	
SO		O-Ring - Nipple	
SZ		Nipple - Relief Valve	
SF		Spring - Relief Valve	
SK	Piston - Relief Valve		
H	H	Manual Lowering - Self Closing	
HA	HO	Seal - Man. Lowering (O-Ring 5.28x1.78 - V)	
	HA	Adjustable Manual Lowering	
KS	KS	Slack Rope Valve	
A	MM	Nut Solenoid	
	AD	Collar Solenoid	
	M	Coil Solenoid (indicate voltage)	
	AR	Tube Solenoid 'Up'	
	MO	O-Ring Solenoid	
	AN	Needle Solenoid 'Up'	
	AF	Spring Solenoid 'Up'	
	AH	Seat Housing 'Up'	
	AS	Seat Solenoid 'Up'	
C+D	M	Coil Solenoid (indicate voltage)	
	C	DR	Tube - Solenoid 'Down', w/o adj. 6
	D	DR6	Tube Solenoid 'Down', with adj. 6
	MO	O-Ring Solenoid	
	DF	Spring Solenoid 'Down'	
	C	DN	Needle Solenoid 'Down'
	D	N6	Needle Solenoid 'Down' (Nipple)
	C	HN	Needle Solenoid 'Down' (Nipple)
	DK	Core Solenoid 'Down'	
	DG	Seat Housing 'Down'(Solen.D with screen)	
	C	S6	Seat Solenoid 'Down'
	C	CO	O-Ring Seat Housing
	Z	ZA	Cylinder Thread Connection
V		Check Valve	
VO		O-Ring Check Valve (5,28x1,78 - V)	
F		Main Filter	
L	L	Gauge Shut Off Cock	



Purpose

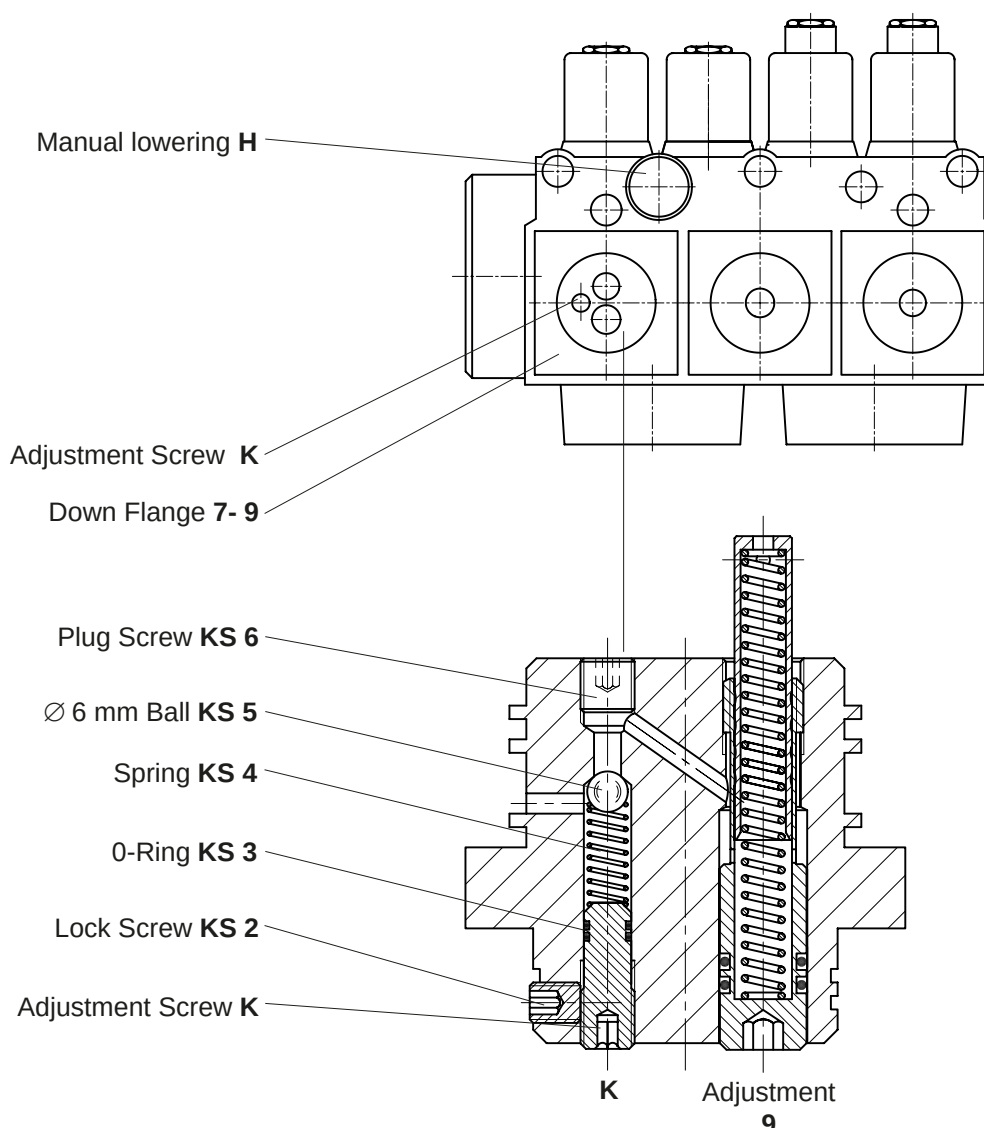
In the case of the operation of the safeties in a 1:2 hydraulic lift system where the weight of the car is no longer carried by the ropes, the electrical supply to the elevator should automatically be switched off. As the ram comes to a stop, usually after about 60 cm, a limited slack rope condition will occur. The **KS** Slack Rope Valve avoids the ram being lowered by the opening of the manual lowering valve which would otherwise cause additional slack rope. The **KS** Slack Rope Valve prevents the pressure holding up the ram from being evacuated through the manual lowering valve.

Function

The **KS** valve is adjusted to a pressure just above the pressure produced by the weight of the ram. When under normal operating conditions, the weight of the car acts upon the ram through the 1:2 roping, the resulting pressure is sufficient to open the poppet of the **KS** valve when the manual lowering **H** is opened, allowing the car to descend as required. When however the 'safeties' have operated and only the weight of the ram and sheave block are acting upon the hydraulic system, the resulting pressure is too low to open the **KS** valve. The ram and sheave block can not be lowered.

Adjustment

The **KS** is adjusted with a 3 mm Socket Key by turning the screw **K** 'in' for higher pressure and 'out' for lower pressure. With **K** turned all the way 'in', then half a turn back out, the unloaded car should descend when the **D** solenoid alone is energised. Should the car not descend, **K** must be backed off until the car just begins to descend, then backed off a further half turn to ensure that with cold oil, the car can be lowered as required.



Overheating of Power Units - System Leakage

Oil temperatures above 55 °C (130° F) should be avoided, otherwise the efficiency of the pump drops considerably and its life is reduced. Aging of the oil is also accelerated.

Possible causes of overheating:

1. Up levelling too long due to the levelling speed being too slow or the slow down switch being set too low.
2. Machine room ventilation inadequate.
3. The frequency of operation is too high for the normal rate of heat dissipation.

Temporary solution:

As a temporary measure to avoid overheating of the oil resulting in the shut down of the elevator, the down speed can be slowed to reduce frequency of operation until a permanent solution is installed.

Cooling systems

- a. If the degree of overheating is not excessive and it takes for example two to three hours for the oil temperature to rise from 20° to 55°C (70° to 130° F), it may be sufficient to improve air circulation around the power unit, for example through the installation of a 0.05 to 0.10 kW ventilator extracting air out of the machine room or through a fan of similar power, blowing air over the power unit.
- b. Should the above be inadequate, depending on the size of the elevator, it will be necessary to install a 10-50 l/min. (3 - 13 gpm) pump to circulate the hot oil through an air cooled radiator of about 0.1 to 0.2 fan kW. It is also essential that there is sufficient extraction of warm air out of the machine room or that the cooler is out side of the machine room, for example in the elevator shaft. The effective cooling power of an air cooled radiator should not to be confused with the power of the fan drive which normally need only be 0.1 or 0.2 kW. Normally, the effective cooling power of a cooler need only be approximately ¼ of the main hydraulic elevator motor, in the case of submersible drives.

Cooling systems for the above purpose should be switched into operation when the oil reaches 30° - 35°C (85° - 95° F).

System leakage (re-levelling)

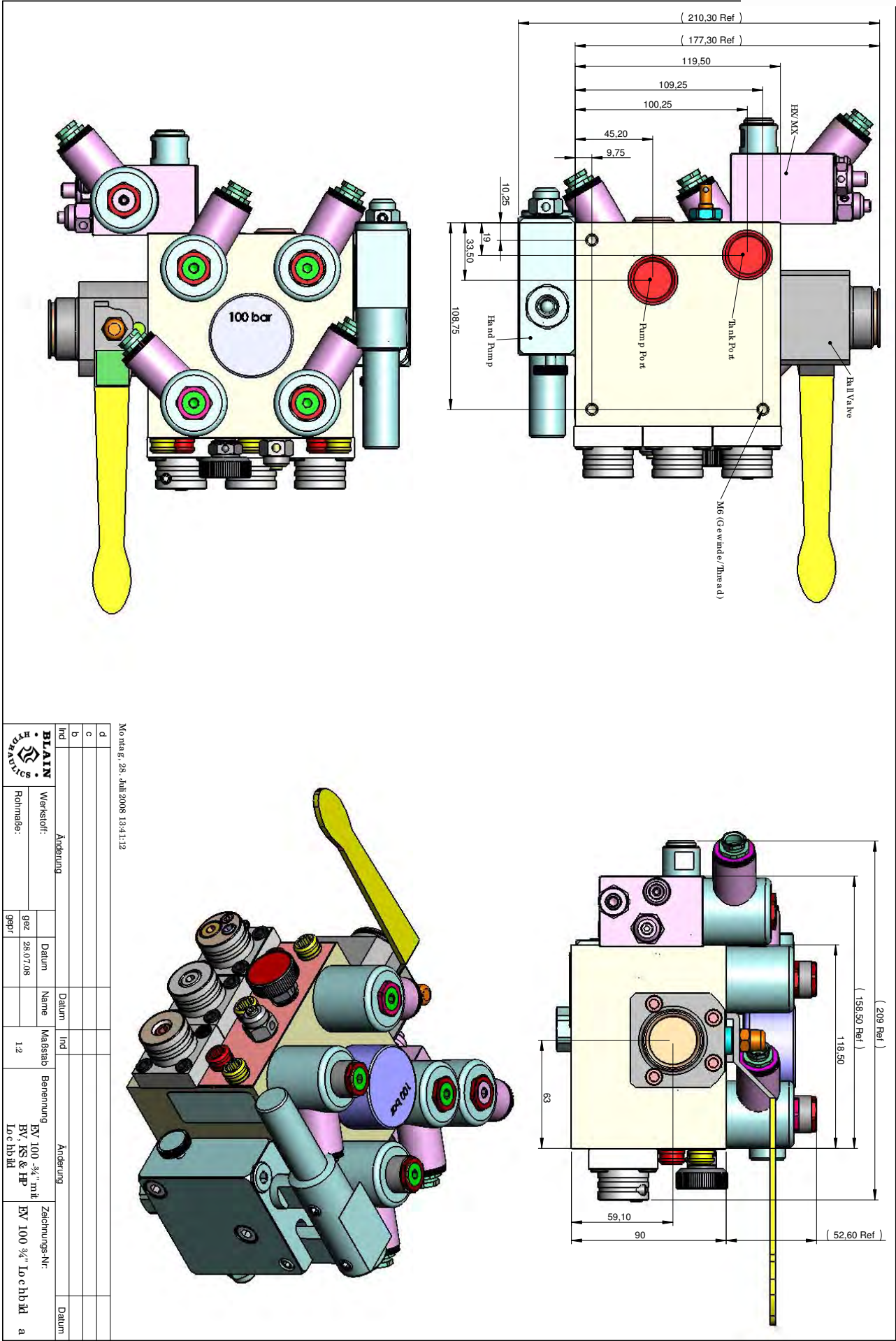
The aim of manufacturers of hydraulic elevator control valves is to produce valves with zero leakage. Due to fine contamination in the oil perfect sealing between valve parts may not always be achieved, leading to a slow down leak of the elevator car.

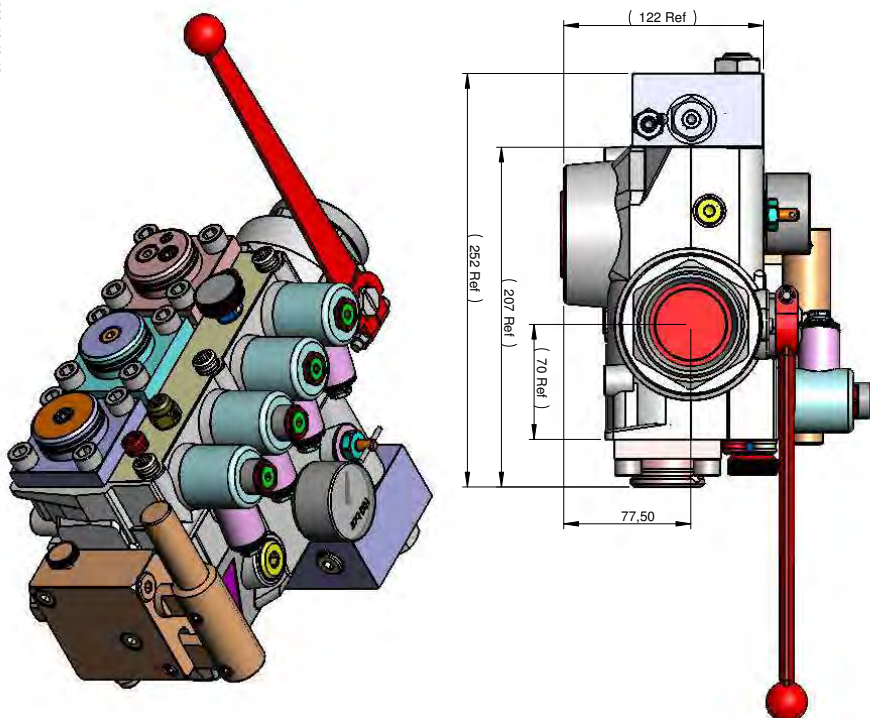
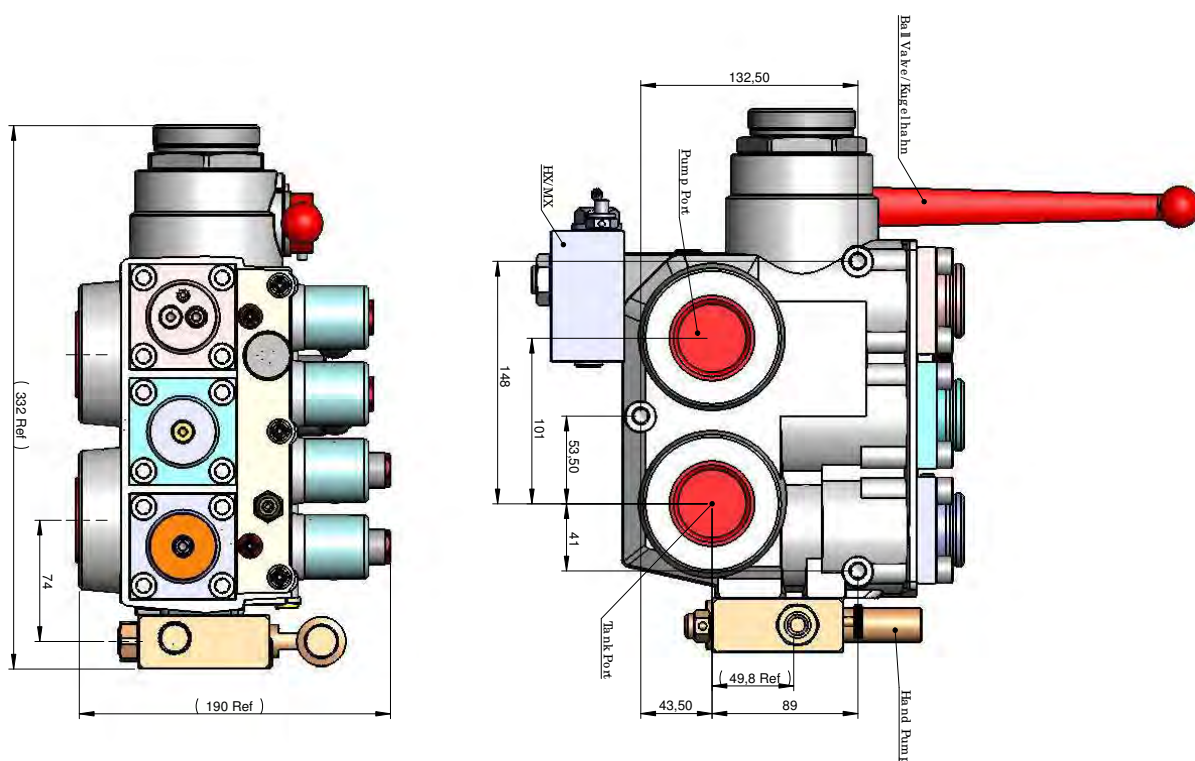
It would become unnecessarily expensive to strive for perfect sealing in every valve in operation. Therefore, because code requirements assure a safe relevelling system whether descent of the car is caused by valve leakage or through the cooling of the oil in the cylinder pressure system, a minor leakage of the control valve can be tolerated.

1. The European Code EN 81-2 require: that the loaded elevator does not leak downwards by more than 10 mm (3/8") in 10 minutes. This is the standard used to determine if a valve should be serviced for leakage.
2. For practical reasons, a quicker method for judging valve leakage is to close the ball valve in the cylinder line and observe the gauge showing pressure in the cylinder chamber of the valve. If this pressure falls to zero in less than 20 secs, it may be necessary to service the valve, depending on the diameter of the main ram and sensitivity of the customer.
3. Down sinking giving the impression of leakage can be due to cooling of the oil.

When the elevator is at rest and the temperature of the oil falls, contraction of the oil in the cylinder and piping causes the car to sink. This sinking is very slow but overnight without relevelling could amount to as much as half a meter, depending on the temperature drop of the oil and the volume of oil in the cylinder system. The elevator relevelling system, operating normally however, keeps the car at floor level.

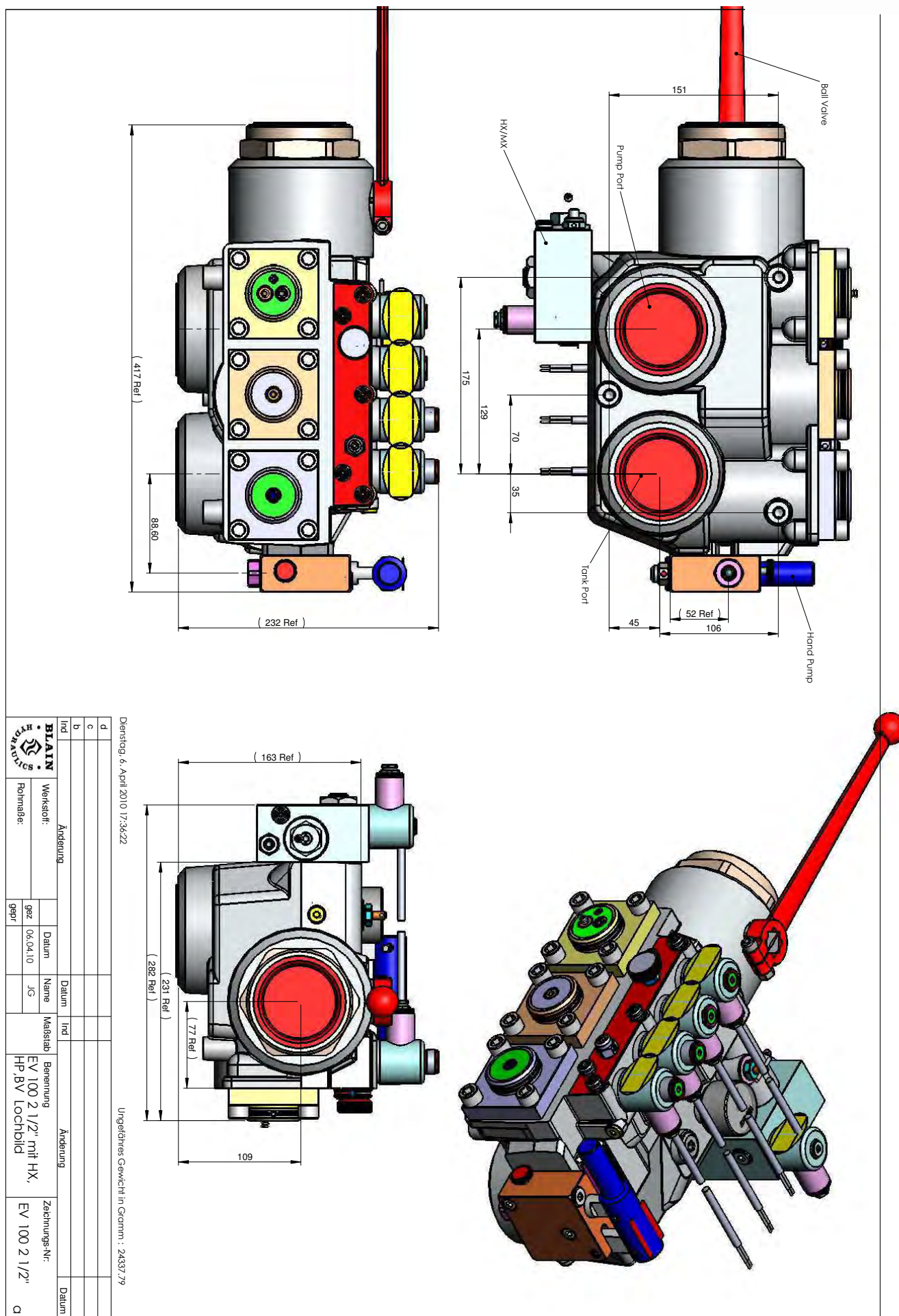
4. In the case of Blain EV valves, see page 10 EV and 16 KV indicating where valve down leakage can occur.

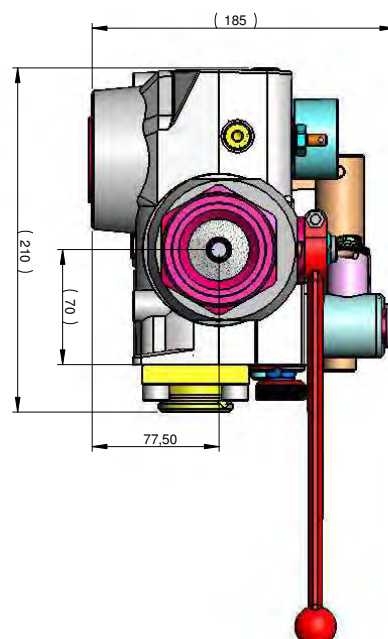
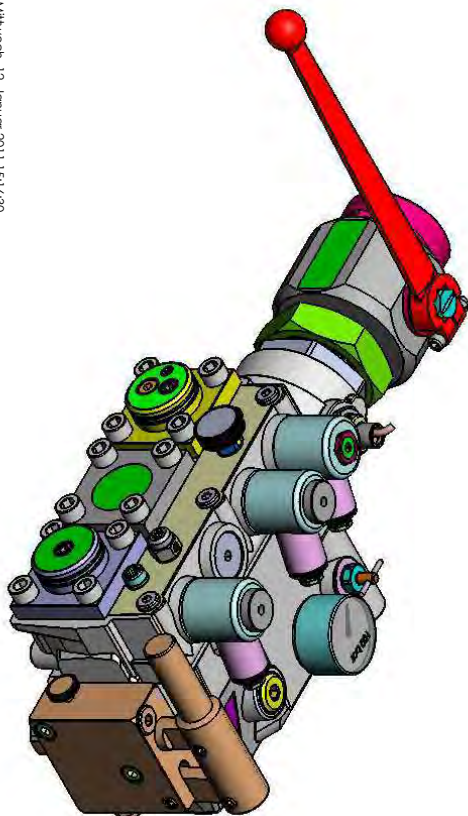
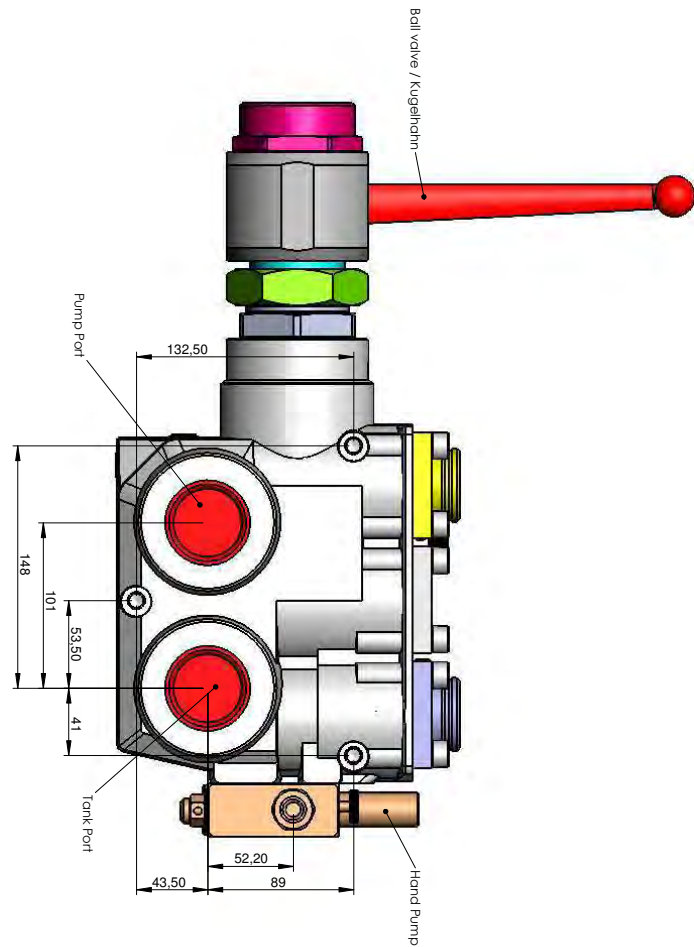
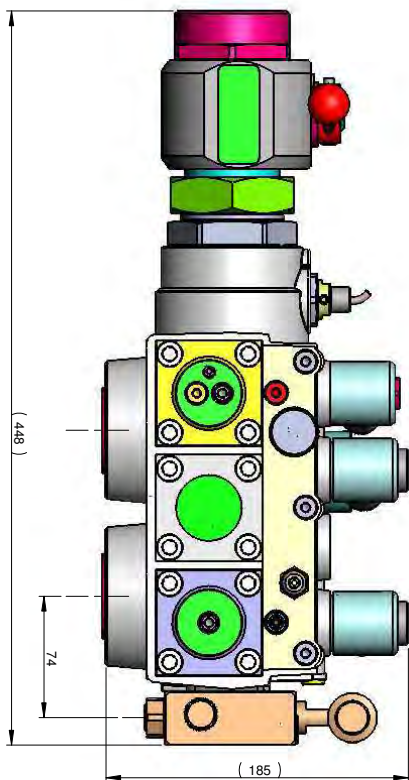




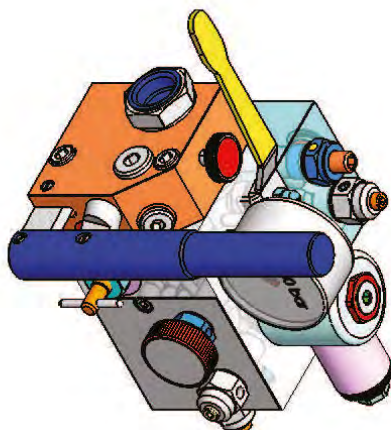
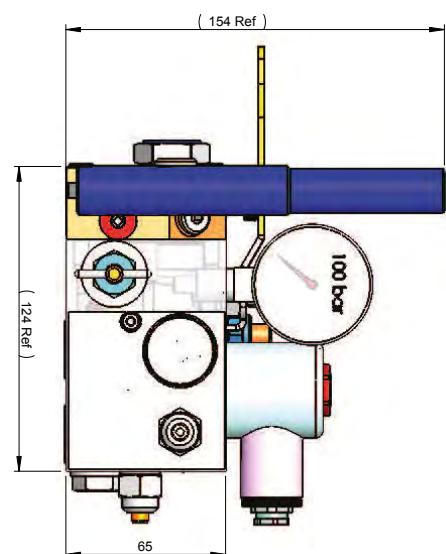
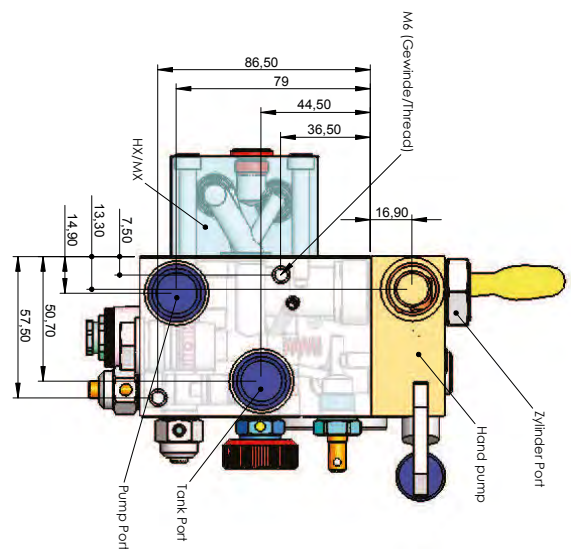
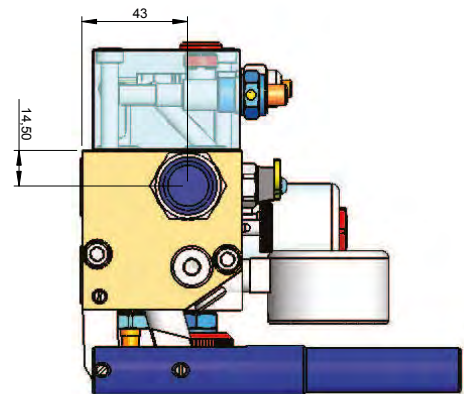
Montag, 9. März 2009 16:13:13

d	c	b	a
Ind	Ind	Ind	Ind
Änderung			
Werkstoff:	Datum	Name	Masstab
Roßmaße:	gezt	29.07.08	1:2
gepr			
Änderung			
Benennung			
EV 100 1 1/2" mit HX, HP, BP			
Lochbild			
Zeichnungs-Nr.:			
EV 100 1 1/2"			
Lochbild			
a			

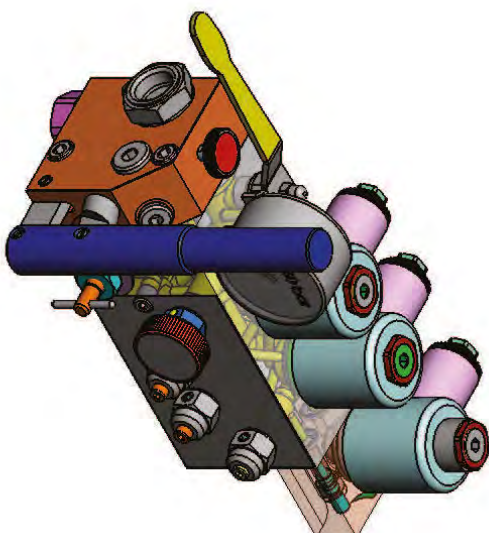
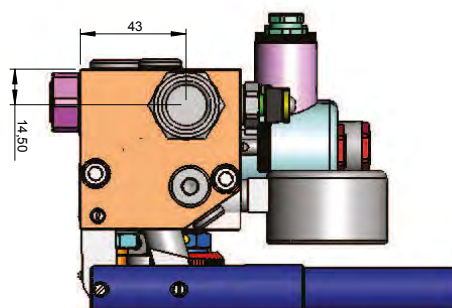
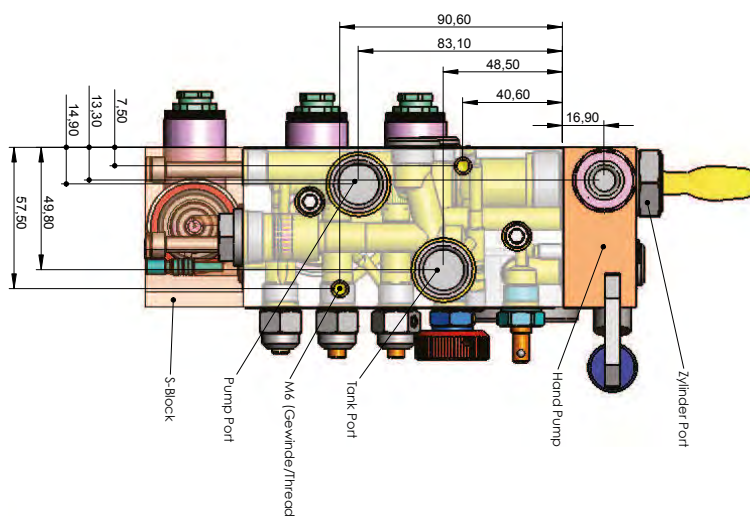




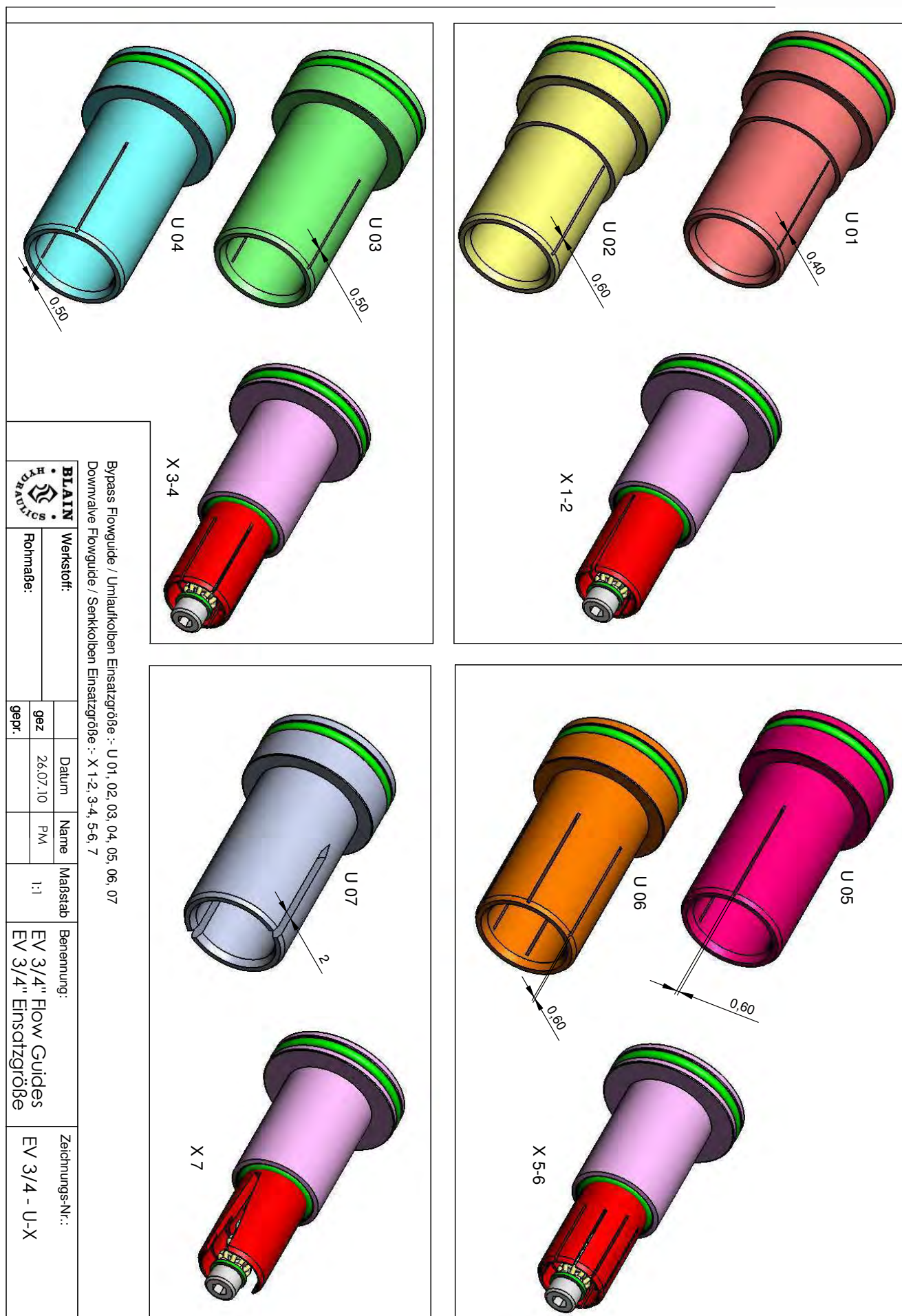
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		gepr							

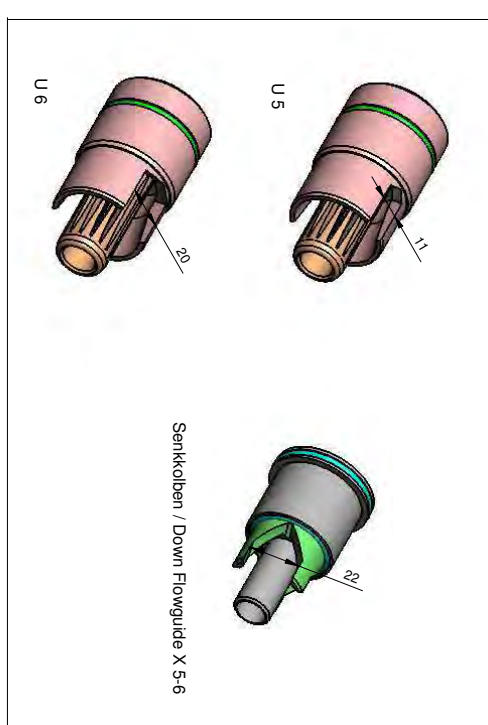
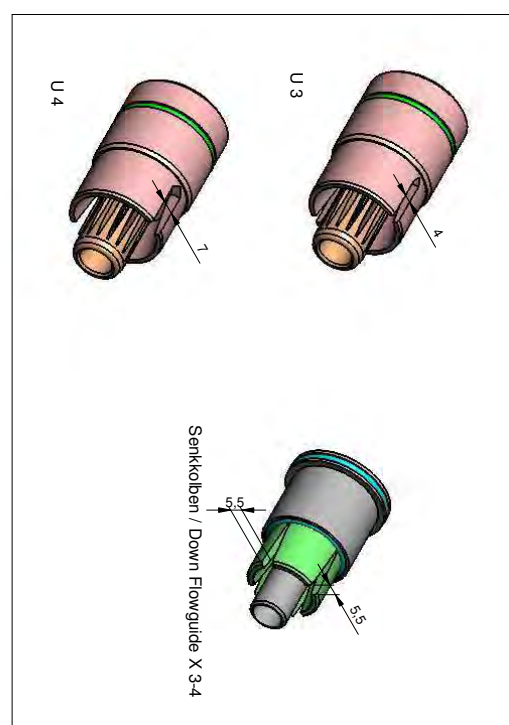
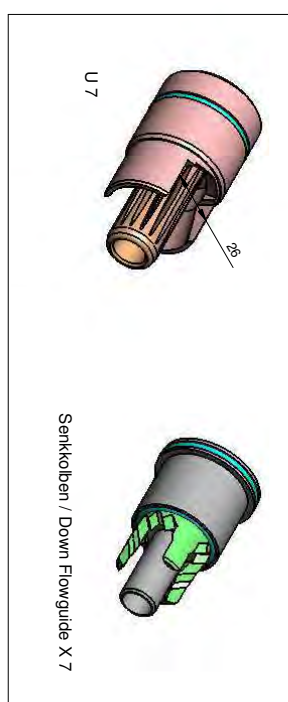
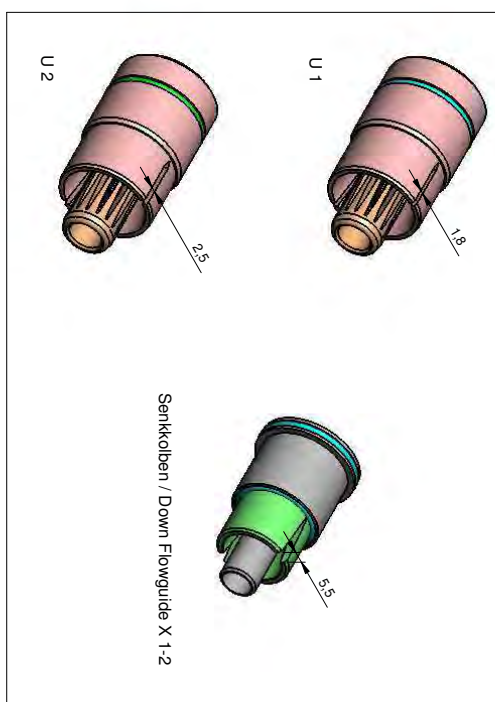
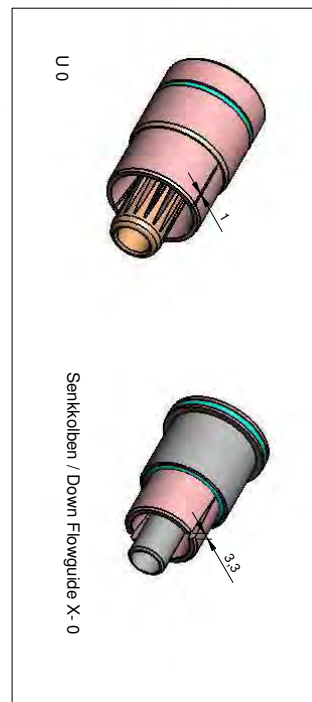


Montag, 28. Juli 2008 10:57:37						
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b						
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Änderung						
BIAIN	Weisstoff:			Malsstab	Benennung	Zeichnungs-Nr.
	Rohmaße:	gez	Datum		KV/P mit BV, HP, HX, KS Lochbild	KV/P-Lochbild
HERAEUS		gepr				a

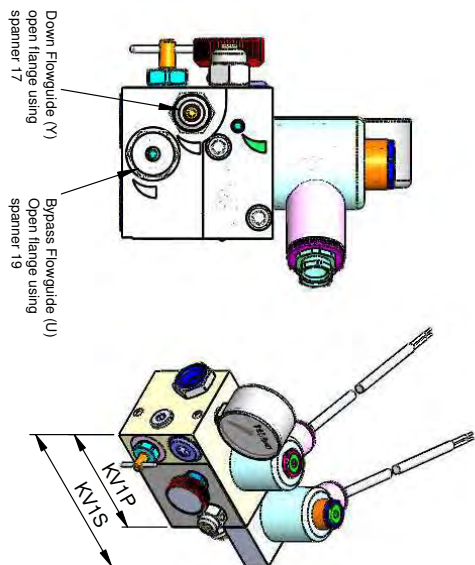


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BLAIN  SCIENTIA TECHNICA	Werkstoff:		Datum	Ind	Änderung	
	Formmaße:					
		gez	28.07.08			
		gepr				
				1:2	Benennung KV2 - BV KS HP Lochbild	Zeichnungs-Nr. KV2 - Lochbild a

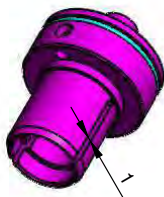




Montag 6. September 2010 11:46:01									
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c									
b									
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Blain		Werkstoff:		Datum	Name	Maßstab	Benennung		Zeichnungs-Nr:
HYPALUX		Formmaße:	gez	03.09.10	PM	1:2	EV 1½-2" Flow Guides EV 1½-2" Einsatzgröße		EV 1.5-2-U-X
			gepr						



U 40



Y 40



U 10



Y 10



U 20



Y 20



U 80



Y 80

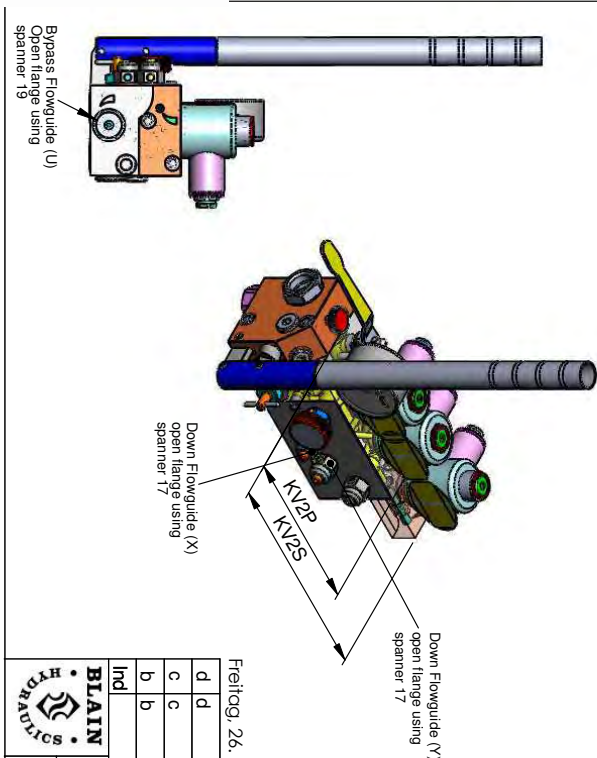
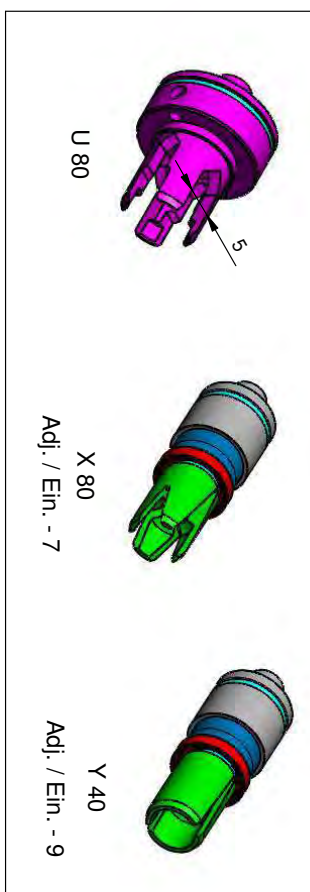
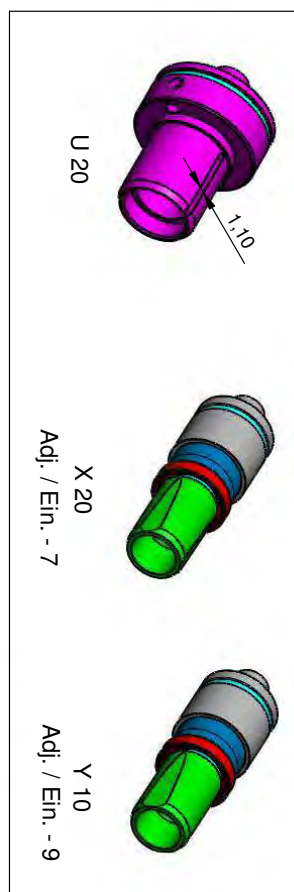
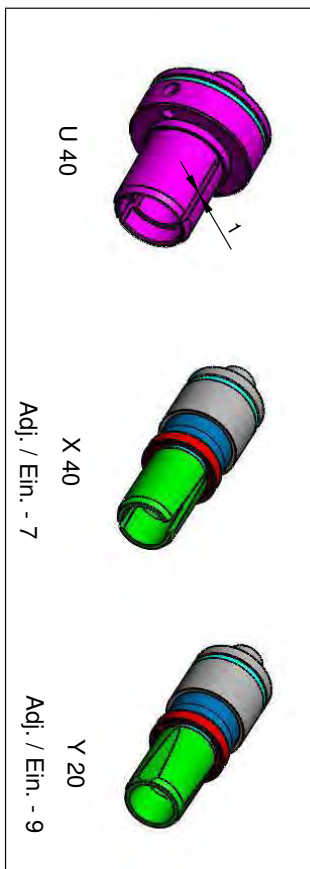
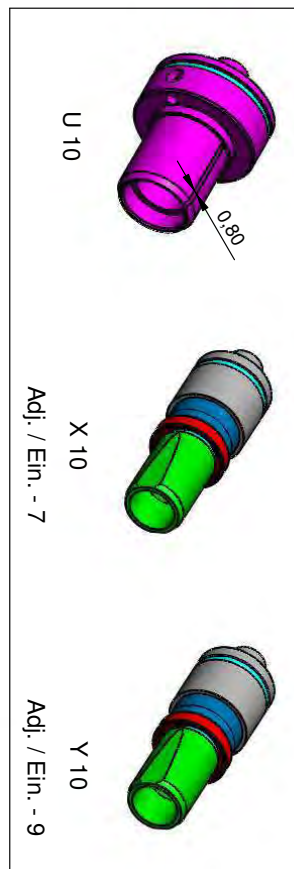


Bypass Flowguide / Umlaufkolben Einsatzgröße :- U 10, 20, 40, 80
 Downvalve Flowguide / Senkkolben Einsatzgröße :- Y 10, 20, 40, 80

Freitag, 26. November 2010 11:15:33

Applicable for KV1P & KV1S

d	d	00.00.00	g	g	00.00.00
c	c	00.00.00	f	f	00.00.00
b	b	00.00.00	e	e	00.00.00
Ind	Ind	Ind	Ind	Ind	Ind
Änderung		Änderung		Änderung	
Werkstoff:		Datum		Name	
Rohrmaße:		gez		PM	
		gepr.		1:1	
		Datum		Benennung:	
		06.09.10		KV1 Flowguides	
				KV1 Einsatzgröße	
				Zeichnungs-Nr.:	
				KV1-U-Y	

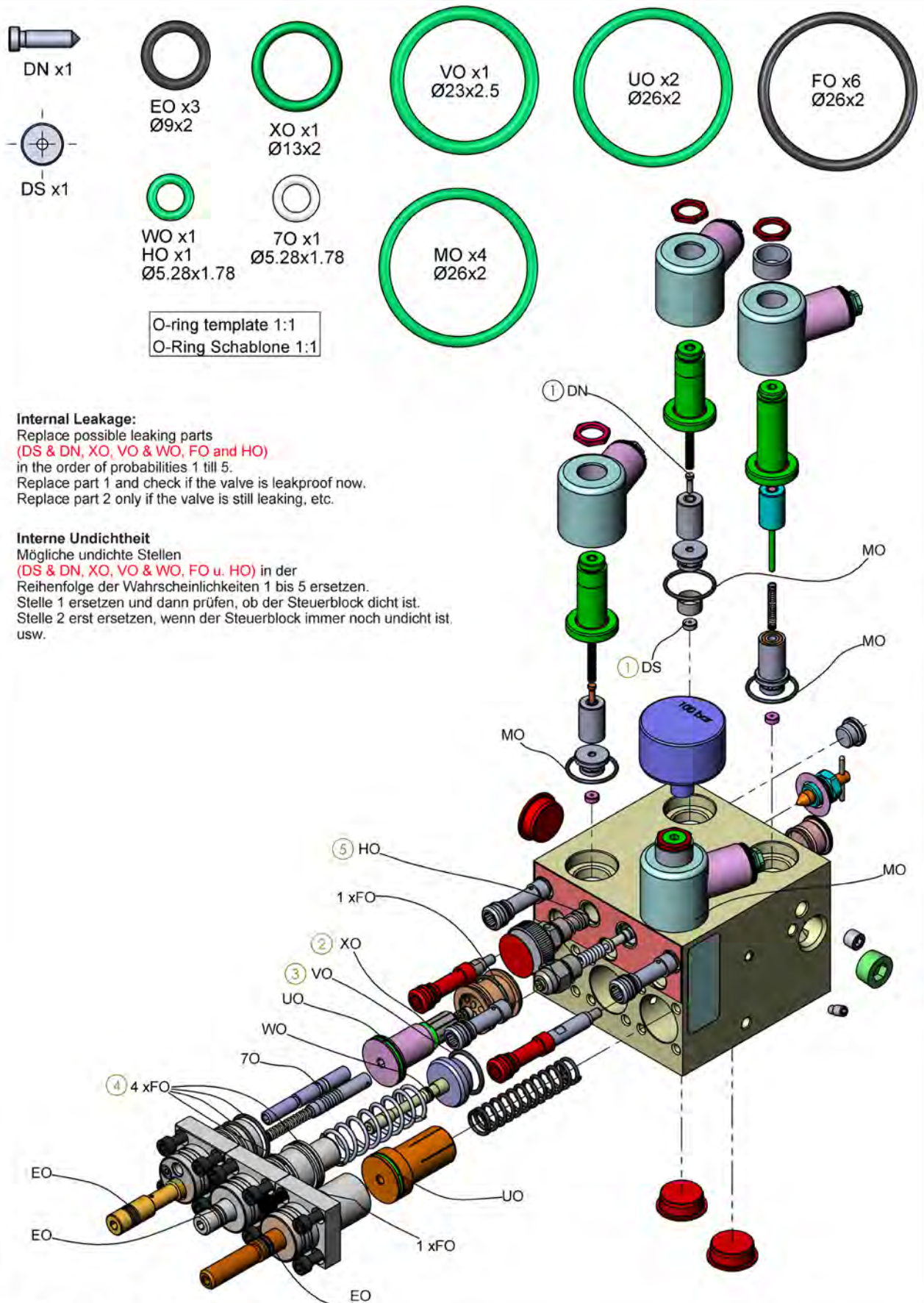


Bypass Flowguide / Umlaufkoben Einsatzgröße :- U 10, 20, 40, 80
Downvalve Flowguide (Adjustment 7) / Senkkolben Einsatzgröße (Ein.7) :- X10, 20, 40, 80..... (Brass / Messing)
Downvalve Flowguide (Adjustment 9) / Senkkolben Einsatzgröße (Ein.9) :- Y10, 20, 40

Freitag, 26. November 2010 11:33:42

Applicable for KV2P & KV2S

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c	00.00.00	f	f	00.00.00
b	00.00.00	e	e	00.00.00
Ind	Datum	Ind	Datum	Datum
Änderung				
Werkstoff:	Datum	Name	Maßstab	Benennung:
Folhmaße:	gez	06.09.10	PM	1:1
gepr.				
KV2 Flowguides				
KV2 Einsatzgrösse				
KV2-U-Y				
Zeichnungs-Nr.:				
Datum				



Freitag, 25. September 2015 10:15:39

	Werkstoff:	Dichtsatz EV 3/4"	Datum	Name	Maßstab	Benennung:	Art. Nr.
	gez.		01.09.2015	BLAIN	1:1	OL EV 3/4" seal set	
	Rohmaße:		gepr.	01.09.2015	BLAIN	OL EV 3/4" Dichtsatz	102209

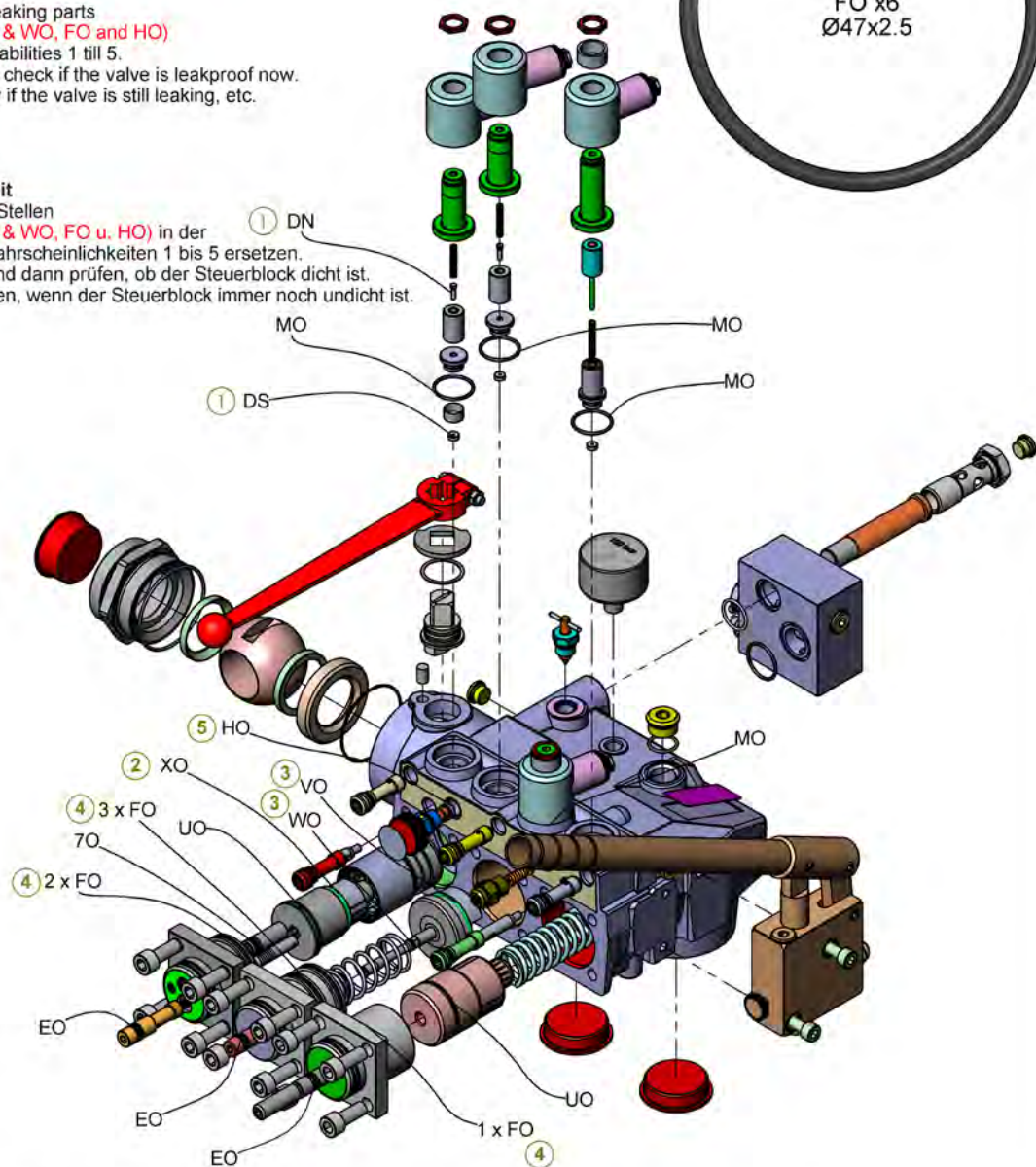


Internal Leakage:

Replace possible leaking parts
(DS & DN, XO, VO & WO, FO and HO)
in the order of probabilities 1 till 5.
Replace part 1 and check if the valve is leakproof now.
Replace part 2 only if the valve is still leaking, etc.

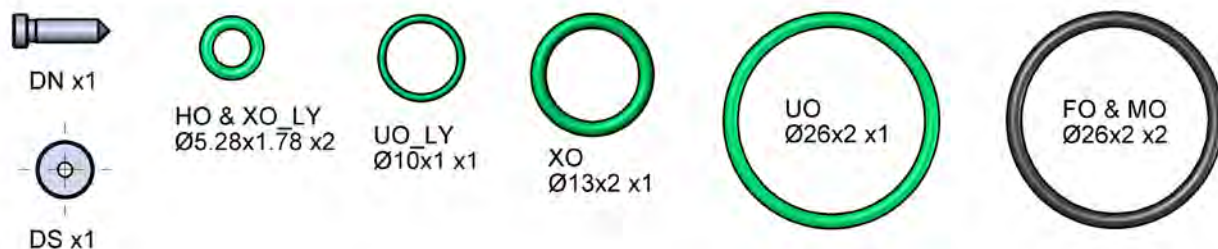
Interne Undichtheit

Mögliche undichte Stellen
(DS & DN, XO, VO & WO, FO u. HO) in der
Reihenfolge der Wahrscheinlichkeiten 1 bis 5 ersetzen.
Stelle 1 ersetzen und dann prüfen, ob der Steuerblock dicht ist.
Stelle 2 erst ersetzen, wenn der Steuerblock immer noch undicht ist.
usw.

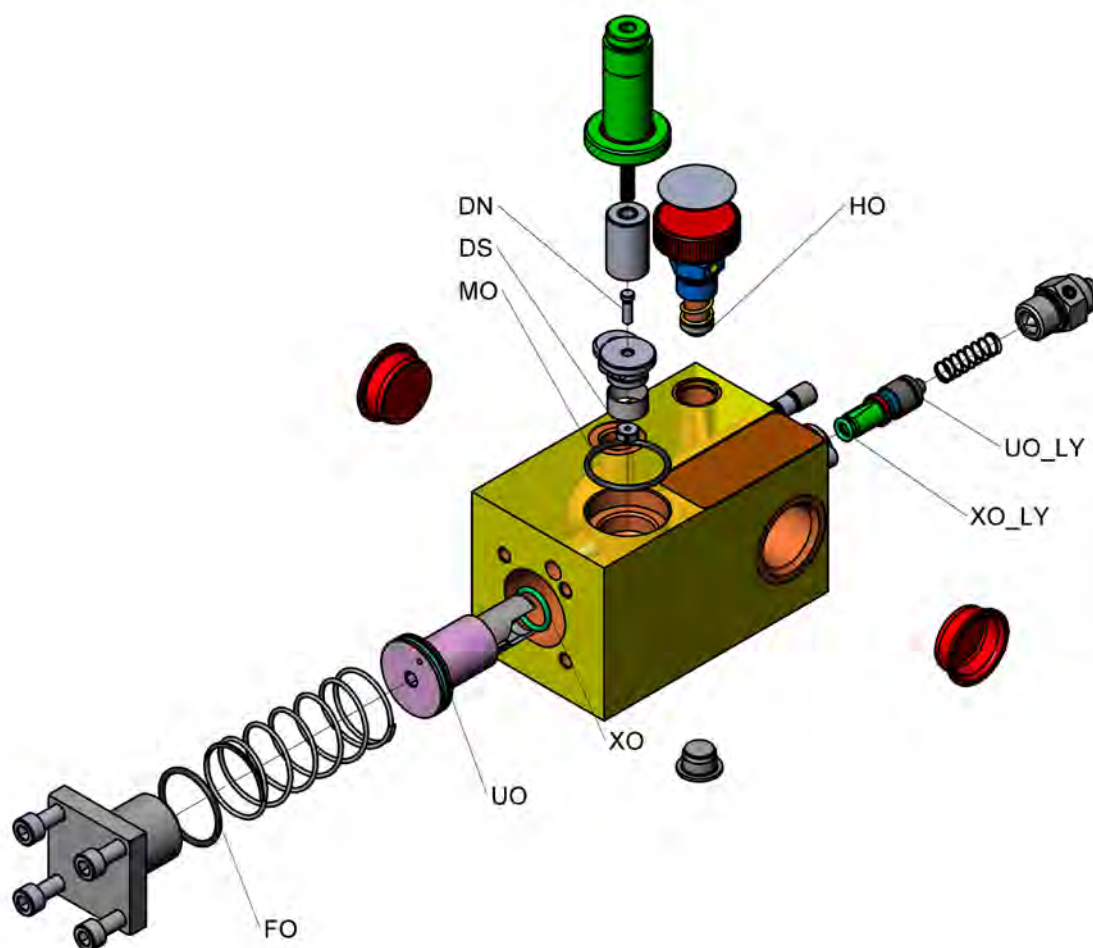


Freitag, 25. September 2015 10:18:37

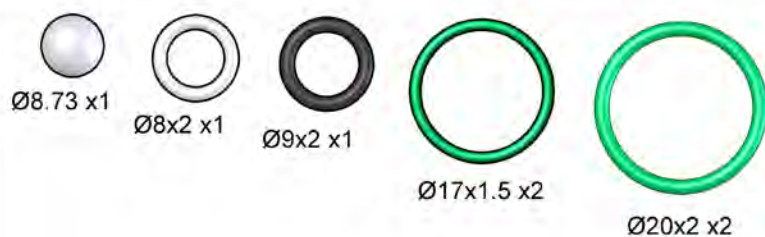
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		Dichtsatz EV1½-2"					
	Rohrmaße:	gez	01.09.2015	BLAIN	1:1	OL EV 1½-2" seal set	102210
	gepr.	01.09.2015	BLAIN		OL EV 1½-2" Dichtsatz		



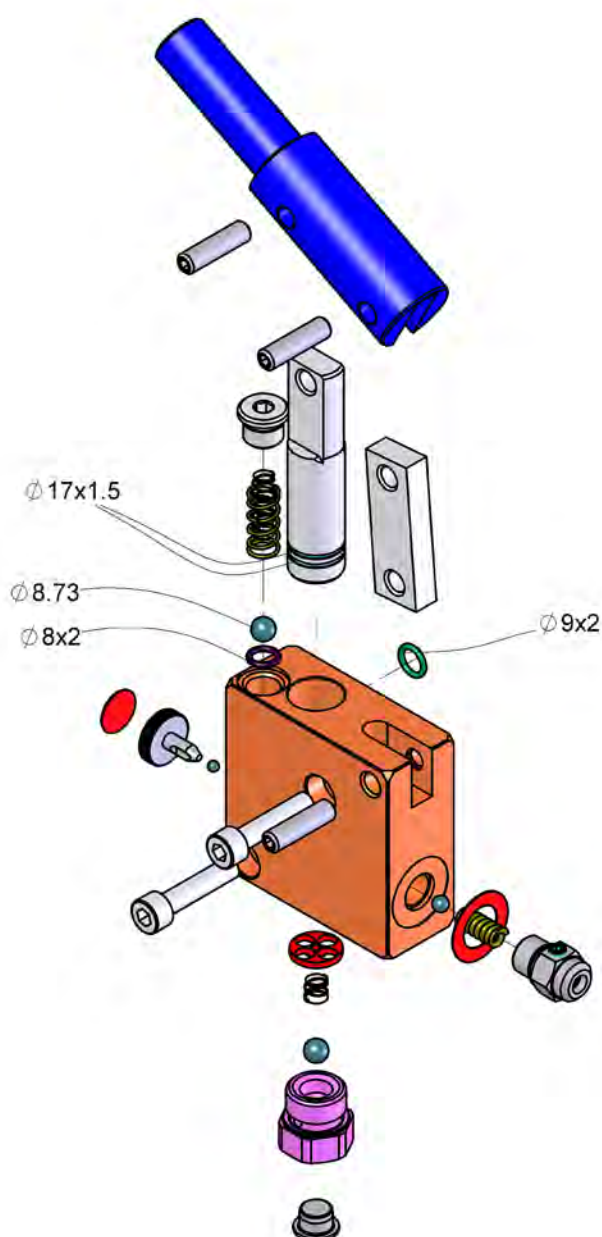
O-ring template 1:1
O-Ring Schablone 1:1



	Werkstoff:		Datum	Name	Maßstab	Benennung:	Art. Nr.:
		Dichtsatz L10 ¾					
	Rohmaße:		gez 01.09.2015	BLAIN	1:1	OL10 ¾ seal set	
			gepr. 01.09.2015	BLAIN		OL10 ¾ Dichtsatz	500059



O-ring template 1:1
O-Ring Schablone 1:1



	Werkstoff: Dichtsatz Handpumpe		Datum	Name	Maßstab 1:1	Benennung: OHP seal set OHP Dichtsatz	Art. Nr.: 500057
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		gepr.	01.09.2015	BLAIN			

Flow - Pressure Tables (US gpm/psi)

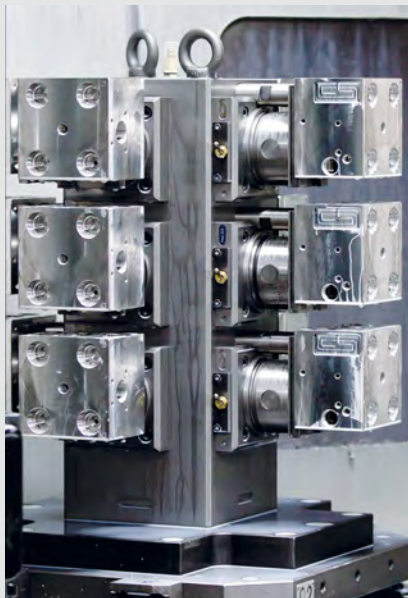
Ram Ø • Area • Speed • Flow

ft/min	10	20	30	40	50	60	70	80	90	100	110	120	140	160	180	200
Ø inch in ²	US gpm															
1.4 1.5	0.8	1.6	2.4	3.2	4.0	4.8	5.6	6.4	7.2	8.0	8.8	9.6	11.2	12.8	14.4	16.0
1.6 2.0	1.0	2.1	3.1	4.2	5.2	6.3	7.3	8.4	9.4	10.5	11.5	12.5	14.6	16.7	18.8	20.9
1.8 2.5	1.3	2.6	4.0	5.3	6.6	7.9	9.3	10.6	11.9	13.2	14.6	15.9	18.5	21.2	23.8	26.5
2.0 3.1	1.6	3.3	4.9	6.5	8.2	9.8	11.4	13.1	14.7	16.3	18.0	19.6	22.9	26.1	29.4	32.7
2.2 3.8	2.0	4.0	5.9	7.9	9.9	11.9	13.8	15.8	17.8	19.8	21.7	23.7	27.7	31.6	35.6	39.5
2½ 4.9	2.6	5.1	7.7	10.2	12.8	15.3	17.9	20.4	23.0	25.5	28.1	30.6	35.7	40.8	45.9	51.0
2.6 5.3	2.8	5.5	8.3	11.0	13.8	16.6	19.3	22.1	24.8	27.6	30.4	33.1	38.6	44.2	49.7	55.2
2¾ 5.9	3.1	6.2	9.3	12.4	15.4	18.5	21.6	24.7	27.8	30.9	34.0	37.1	43.2	49.4	55.6	61.8
3.0 7.1	3.7	7.3	11.0	14.7	18.4	22.0	25.7	29.4	33.1	36.7	40.4	44.1	51.4	58.8	66.1	73.5
3.2 8.0	4.2	8.4	12.5	16.7	20.9	25.1	29.3	33.4	37.6	41.8	46.0	50.2	58.5	66.9	75.3	83.6
3½ 9.6	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	70.0	80.0	90.0	100.0
3.6 10.2	5.3	10.6	15.9	21.2	26.5	31.7	37.0	42.3	47.6	52.9	58.2	63.5	74.1	84.7	95.2	105.8
3.8 11.3	5.9	11.8	17.7	23.6	29.5	35.4	41.3	47.2	53.1	59.0	64.9	70.7	82.5	94.3	106.1	117.9
4.0 12.6	6.5	13.1	19.6	26.1	32.7	39.2	45.7	52.3	58.8	65.3	71.9	78.4	91.5	104.5	117.6	130.7
4.2 13.9	7.2	14.4	21.6	28.8	36.0	43.2	50.4	57.6	64.8	72.0	79.2	86.4	100.8	115.2	129.6	144.0
4¾ 15.0	7.8	15.6	23.4	31.3	39.1	46.9	54.7	62.5	70.3	78.1	86.0	93.8	109.4	125.0	140.7	156.3
4½ 15.9	8.3	16.5	24.8	33.1	41.3	49.6	57.9	66.1	74.4	82.7	90.9	99.2	115.8	132.3	148.8	165.4
4.8 18.1	9.4	18.8	28.2	37.6	47.0	56.4	65.8	75.3	84.7	94.1	103.5	112.9	131.7	150.5	169.3	188.1
5.0 19.6	10.2	20.4	30.6	40.8	51.0	61.2	71.5	81.7	91.9	102.1	112.3	122.5	142.9	163.3	183.7	204.1
5¾ 23.2	12.1	24.1	36.2	48.3	60.4	72.4	84.5	96.6	108.6	120.7	132.8	144.9	169.0	193.1	217.3	241.4
5½ 23.8	12.4	24.7	37.1	49.4	61.8	74.1	86.5	98.8	111.2	123.5	135.9	148.2	172.9	197.6	222.3	247.0
6.0 28.3	14.7	29.4	44.1	58.8	73.5	88.2	102.9	117.6	132.3	147.0	161.7	176.4	205.8	235.2	264.6	294.0
6½ 33.2	17.3	34.5	51.8	69.0	86.3	103.5	120.8	138.0	155.3	172.5	189.8	207.0	241.5	276.0	310.5	345.0
6.8 36.3	18.9	37.8	56.6	75.5	94.4	113.3	132.2	151.0	169.9	188.8	207.7	226.6	264.3	302.1	339.8	377.6
7.0 38.5	20.0	40.0	60.0	80.0	100.0	120.0	140.0	160.1	180.1	200.1	220.1	240.1	280.1	320.1	360.1	400.1
7½ 44.2	23.0	45.9	68.9	91.9	114.8	137.8	160.8	183.7	206.7	229.7	252.6	275.6	331.5	367.5	413.4	459.3
8.0 50.3	26.1	52.3	78.4	104.5	130.7	156.8	182.9	209.0	235.2	261.3	287.4	313.6	365.8	418.1	470.4	522.6
8½ 56.7	29.5	59.0	88.5	118.0	147.5	177.0	206.5	236.0	265.5	295.0	324.5	354.0	413.0	472.0	531.0	590.0
8.8 60.8	31.6	63.2	94.9	126.5	158.1	189.7	221.3	252.9	284.6	316.2	347.8	379.4	442.7	505.9	569.1	632.4
9½ 70.9	36.8	73.7	110.5	147.4	184.2	221.1	257.9	294.8	331.6	368.5	405.3	442.2	515.9	589.6	663.3	737.0
10% 88.7	46.1	92.2	138.3	184.4	230.5	276.6	322.6	368.7	414.8	460.9	507.0	553.1	645.3	737.5	829.7	921.9
11.2 98.5	51.2	102.4	153.6	204.9	256.1	307.3	358.5	409.7	460.9	512.2	563.4	614.6	717.0	819.5	921.9	1024.3
12.0 113.1	58.8	117.6	176.4	235.2	294.0	352.8	411.6	470.4	529.1	587.9	646.7	705.5	823.1	940.7	1058.3	1175.9

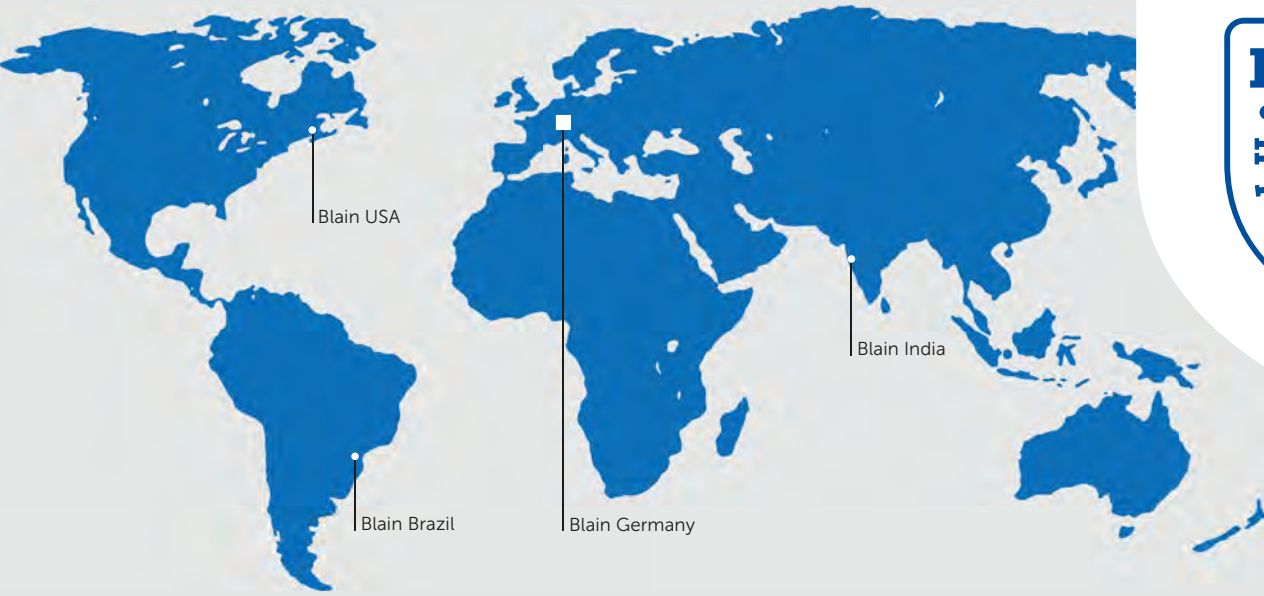
Ram Ø • Area • Load • Pressure

lbs	1100	1650	2200	3300	4400	5500	6600	7700	8800	10000	11000	13200	15400	17600	19800	22000
Ø inch in ²	psi															
1.4 1.5	714.6	1071.9	1429.1	2143.7	2858.3	3572.9	4287.4	5002.0	5716.6	6496.1	7145.7	8574.9	10004.0	11433.2	12862.3	14291.5
1.6 2.0	547.1	820.6	1094.2	1641.3	2188.4	2735.5	3282.6	3829.7	4376.8	4973.6	5471.0	6565.1	7659.3	8753.5	9847.7	10941.9
1.8 2.5	432.3	648.4	864.5	1296.8	1729.1	2161.4	2593.6	3025.9	3458.2	3929.8	4322.7	5187.3	6051.8	6916.4	7780.9	8645.5
2.0 3.1	350.1	525.2	700.3	1050.4	1400.6	1750.7	2100.8	2451.0	2801.1	3183.1	3501.4	4201.7	4902.0	5602.3	6302.5	7002.8
2.2 3.8	289.4	434.1	578.7	868.1	1157.5	1446.9	1736.2	2025.6	2315.0	2630.7	2893.7	3472.5	4051.2	4630.0	5208.7	5787.5
2½ 4.9	224.1	336.1	448.2	672.3	896.4	1020.5	1344.5	1568.6	1792.7	2037.2	2240.9	2689.1	3137.3	3585.4	4033.6	4481.8
2.6 5.3	207.2	310.8	414.4	621.6	828.7	1035.9	1243.1	1450.3	1657.5	1883.5	2071.8	2486.2	2900.6	3314.9	3729.3	4143.7
2¾ 5.9	185.2	277.8	370.4	555.6	740.8	926.0	1111.2	1296.4	1481.6	1683.6	1852.0	2222.4	2592.8	2963.2	3333.6	3704.0
3.0 7.1	155.6	233.4	311.2	466.9	622.5	778.1	933.7	1089.3	1244.9	1414.7	1556.2	1867.4	2178.7	2489.9	2801.1	3112.4
3.2 8.0	136.8	205.2	273.5	410.3	547.1	683.9	820.6	957.4	1094.2	1243.4	1367.7	1641.3	1914.8	2188.4	2461.9	2735.5
3½ 9.6	114.3	171.5	228.7	343.0	457.3	571.7	686.0	800.3	914.7	1039.4	1143.3	1372.0	1600.6	1829.3	2058.0	2286.6
3.6 10.2	108.1	162.1	216.1	324.2	432.3	540.3	648.4	756.5	864.5	982.4	1080.7	1296.8	1513.0	1729.1	1945.2	2161.4
3.8 11.3	97.0	145.5	194.0	291.0	388.0	485.0	582.0	678.9	775.9	881.7	969.9	1163.9	1357.9	1551.9	1745.9	1939.8
4.0 12.6	87.5	131.3	175.1	262.6	350.1	437.7	525.2	612.7	700.3	795.8	875.4	1050.4	1225.5	1400.6	1575.6	1750.7
4.2 13.9	79.4	119.1	158.8	238.2	317.6	397.0	476.4	555.8	635.2	721.8	794.0	952.8	1111.6	1270.4	1429.1	1587.9
4¾ 15.0	73.2	109.8	146.3	219.5	292.7	365.9	439.0	512.2	585.4	665.2	731.7	878.1	1024.4	1170.8	1317.1	1463.4
4½ 15.9	69.2	103.7	138.3	207.5	276.7	345.8	415.0	484.1	553.3	628.8	691.6	830.0	968.3	1106.6	1244.9	1383.3
4.8 18.1	60.8	91.2	121.6	182.4	243.2	303.9	364.7	425.5	486.3	552.6	607.9	729.5	851.0	972.6	1094.2	1215.8
5.0 19.6	56.0	84.0	112.0	168.1	224.1	280.1	336.1	392.2	448.2	509.3	560.2	672.3	784.3	896.4	1008.4	1120.5
5¾ 23.2	47.4	71.1	94.7	142.1	189.5	236.9	284.2	331.6	379.0	430.6	473.7	568.4	663.2	757.9	852.7	947.4
5½ 23.8	46.3	69.4	92.6	138.9	185.2	231.5	277.8	324.1	370.4	420.9	463.0	555.6	648.2	740.8	833.4	926.0
6.0 28.3	38.9	58.4	77.8	116.7	155.6	194.5	233.4	272.3	311.2	353.7	389.0	466.9	544.7	622.5	700.3	778.1
6½ 33.2	33.1	49.7	66.3	99.4	132.6	165.7	198.9	232.0	265.2	301.4	331.5	397.8	464.1	530.4	596.7	663.0
6.8 36.3	30.3	45.4	60.6	90.9	121.2	151.4	181.7	212.0	242.3	275.4	302.9	363.5	424.0	484.6	545.2	605.8
7.0 38.5	28.6	42.9	57.2	85.7	114.3	142.9	171.5	200.1	228.7	259.8	285.8	343.0	400.2	457.3	514.5	571.7
7½ 44.2	24.9	37.3	49.8	74.7	99.6	124.5	149.4	174.3	199.2	226.4	249.0	298.8	348.6	398.4	448.2	498.0
8.0 50.3	21.9	32.8	43.8	65.7	87.5	109.4	131.3	153.2	175.1	198.9	218.8	262.6	306.4	350.1	393.9	437.7
8½ 56.7	19.4	29.1	38.8	58.2	77.5	96.9	116.3	135.7	155.1	176.2	193.8	232.6	271.4	310.2	348.9	387.7
8.8 60.8	18.1	27.1	36.2	54.3	72.3	90.4	108.5	126.6	144.7	164.4	180.9	217.0	253.2	289.4	325.5	361.7
9½ 70.9	15.5	23.3	31.0	46.6	62.1	77.6	93.1	108.6	124.1	141.1	155.2	186.2	217.3	248.3	279.3	310.4
10% 88.7	12.4	18.6	24.8	37.2	49.6	62.0	74.4	86.8	99.3	112.8	124.1	148.9	173.7	198.5	223.3	248.1
11.2 98.5	11.2	16.7	22.3	33.5	44.7	55.8	67.0	78.2	89.3	101.5	111.7	134.0	156.3	178.6	201.0	223.3
12.0 113.1	9.7	14.6	19.5	29.2	38.9	48.6	58.4	68.1	77.8	88.4	97.3	116.7	136.2	155.6	175.1	194.5

in² = 6.45 cm²



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